

FINAL REPORT

Designing and evaluating carbon neutral / negative development options for Leicester Outdoor Pursuits Centre

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Executive Summary

This report summarizes the process and outcomes of an AHRC-funded Design Exchange Partnership ('Net Zero' grant) between De Montfort University (Prof Tracy Harwood), Leicester Outdoor Pursuits Centre (LOPC centre manager, Stuart Fraser) and Zainab Mohammed (PhD candidate at De Montfort University). The project ran between November 2021 and July 2022.

The project aims were to evaluate carbon neutral/negative design and development options for LOPC buildings and site; to devise a concept design that integrated the 150 years old heritage of LOPC and its 15 acres of flood plain close to the centre of Leicester city; explore how the buildings on the site may become flood resilient; address the business needs to extend activities to achieve LOPC's business goals; reflecting net zero in all aspects of its operations; assess current user needs to evaluate where physical space is required; explore how environmental empathy could be built into the site's future development scheme; and to consider how stakeholders could be integrated into future developments of LOPC through the lifecycle of the site development process.

The work undertaken involved a detailed site evaluation and presentation of preliminary findings to LOPC's Board of Trustees before embarking on concept development. Concept development then drew inspiration from three aspects of the site evaluation process -

- heritage of LOPC building (Swiss chalet A-frame design)
- River Soar and its flow through the LOPC site
- river-based sports activities that have taken place on the LOPC site throughout its history of kayaking and canoeing

The preliminary design concepts included three blocks that could be built as a phased development allowing for fund raising and income from new activities to be generated over an extended time period. Blocks were designed to address site flood risks identified and to increase accommodation for staff and operational amenities and facilities.

Design concepts were integrated into a stakeholder evaluation consultation strategy. Evaluation involved a mixed methods research design comprising interviews, focus groups and a survey with key stakeholder groups identified by LOPC. Data was collected between March and May 2022. Analysis of findings highlighted broad and enthusiastic support for the potential design concept and accommodation as well as a number of potential new activities that require further exploration. Key suggestions were then integrated into the preliminary designs resulting in refined concepts which have been included as an appendix to this report.

Recommendations resulting from the project relate to the additional activities identified which need to be explored and modelled to determine business and operational impact, income potential and how the site is developed. The further work will enable LOPC to determine next steps in generating an income strategy for funding the site developments, business growth and integration into Leicester's broad plans for citizen health and wellbeing by, for example, connecting with other infrastructure and tourism developments in the city, developing new partnerships, and in raising user group awareness and interest in LOPC.

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List of Key Terms

Net Zero – cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere. The energy sector is the source of around three-quarters of greenhouse gas emissions today and holds the key to averting the worst effects of climate change.

Carbon Neutral – reducing our emissions through climate action. Climate neutrality refers to the idea of achieving Net Zero greenhouse gas emissions by balancing those emissions, so they are equal (or less than) the emissions that get removed through the planet's absorption.

1. Project Funding and Partnership

This project was funded by AHRC's Design Exchange Partnership 'Net Zero' grant, supported by Design Museum and Innovate UK.

The project is part of the Design Museum's [Future Observatory Programme](#). The project ran for 8 months between November 2021 and July 2022.

The project was a partnership between

- De Montfort University's Prof Tracy Harwood, Professor of Digital Culture at Institute of Creative Technologies (principal investigator)
- Leicester Outdoor Pursuits Centre's Stuart Fraser, Centre Manager, supported by Andy Viner, Member of Board of Trustees, and
- Zainab Mohammed, Design Researcher and sustainable architecture PhD candidate at De Montfort University.

The project was supported by De Montfort University's Business Development team, Rianna Briars and Darsheet Chauhan (Knowledge Exchange Officers).

The project was led by De Montfort University, including operational and financial arrangements in relation to the employment of the Design Researcher, who was employed on a part-time contract to complete the project aligning with the terms of the grant.

2. Project Aims and Objectives

2.1 Aims

The project aimed to

- evaluate carbon neutral/negative design and development options for LOPC buildings and site
- devise a concept design that
 - integrated the 150 years old heritage of LOPC and its 15 acres of flood plain close to the centre of Leicester city
 - explore how the buildings on the site may become flood resilient
 - address the business needs to extend activities to achieve LOPC's business goals, reflecting net zero in all aspects of its operations
 - assess current user needs to evaluate where physical space is required
 - explore how environmental empathy could be built into the site's future development scheme.
- consider how stakeholders could be integrated into future developments of LOPC through the lifecycle of the site development process

2.2 Objectives

1. Develop and evaluate concept designs that articulate its net zero/carbon negative objectives
2. Explore how LOPC may be redeveloped by conceptualising a new centre and facilities complex that appeals to its regional, national, and potentially international audiences and stakeholders
3. Provide baseline information from a preliminary consultation process for a new centre building and its Land-and-Water based programme through which LOPC can achieve Net-Zero/Carbon Negative contribution to the city

3. Background to Concept Design and Development

3.1 LOPC Needs and Considerations

Preliminary discussions with LOPC identified a number of areas that the project needed to consider in the development of a design concept. These were

- the current site, its use and functionality in relation to the services offered to its breadth of stakeholders
- the established collaborations with partner organizations, including those that share parts of the site for their own operations
- environmental impact of the current offer and its future development
- social and community impacts of the current offer and its future development
- commercial and operational implications of the current offer and future developments

3.1.1 Current Site

LOPC is a charity that provides adventurous outdoor activity experiences designed to stimulate, educate and motivate young people and others at affordable prices in a challenging and safe environment. By delivering challenging but safe activities to a wide range of users, LOPC has become financially cost-neutral, setting and meeting annual budgets whilst using capital funding to support ongoing developments of facilities and activities.

LOPC has an approach to its business that enables it to develop programmes of activities that focus on -

- making available a wide range of adventure activities creating opportunities for the community of Leicester and surrounding areas
- providing a community centre for the use of Leicestershire and the surrounding area
- encouraging and helping all, especially young people, to promote health, wellbeing and education, to develop self-reliance and independence, and to acquire a greater knowledge, enjoyment and care for the countryside and environment using adventure and leisure activities in both recreational and competitive activities

- promote and organising, or assisting in promoting and organising events, meetings, regattas, championships, trials, rallies, training sessions, tours, festivals and other competitive and recreational events to encourage and support adventure and leisure activities
- operating and practicing an equal opportunities policy, through all activities and at all levels
- encouraging personal development through participation in a wide range of leisure activities at all levels
- providing educational and training opportunities for individuals and groups within the facilities at the Centre and elsewhere
- encouraging a greater awareness and participation of adventure opportunities for the disabled
- maximising the use of the Centre and its resources.

Existing buildings and activities -

- Main Site Building
 - Offices
 - 2 multi-use rooms
 - First Aid
 - Staff & Children Toilets/Changing
 - Kitchenette
- Boat Storage
 - Canoe
 - Kayak
- 3 Independent Units
 - Soar Valley Canoe Club
 - Paddle Plus
 - Leicester Outdoor Pursuits Centre

Proposed building and activities -

- Multi-use spaces
- Kitchenette
- Offices
- Boat and equipment storage
- Changing rooms and toilets
- Staff offices, changing rooms and break room
- First-aid room
- Indoor climbing gymnasium
- Coffee shop
- Offices and meeting rooms

To assist LOPC to prioritise plans for incremental redevelopment, it was considered important to support project development by identifying short and longer-term actions the organization may take to deliver its net-zero goals.

3.1.2 Collaborations and Partnerships

Key collaborations and partnerships were identified in three broad categories

- Site-based stakeholders
- Programme delivery partners
- Key customers

3.1.3 Environmental Impacts

Identified considerations for environmental impacts were

- location on a flood plain necessitating a design that is flood resilient
- use of passive design concepts that utilise renewable and recyclable sources of materials thereby emitting zero carbon and minimising materials waste
- maximise use of natural daylight and ventilation creating healthy built environments for users and use renewable sources of energy such as solar power which can be generated on site
- potential to store and repurpose annual flood waters
- explore alternative power source options such as hydro-generated energy
- enhance biodiversity across its site
- potential to generate energy from site eg., sports-related activities
- provision of electric vehicle charging on site from renewable sources

3.1.4 Social and Community Impacts

Identified considerations for social and community impacts were

- important to retain local status as a provider of outdoor sports facilities
- ambition to become a national and international training centre
- current and target users are already highly attuned to their environmental impact, suggesting their willingness to engage in sustainable alternatives that meet their personal and societal needs
- facilities demonstrating strategies for sustainability can support communities to improve environment quality and reduce health risks through knowledge transfer
- project will create new job opportunities as the site begins to develop to achieve its ambitions

3.1.5 Commercial and Operational Impacts

Commercial and operational impacts identified were

- a 5-10 years site development plan to support planning and funding raising activities
- a staged redevelopment eg., with interim installation of solar panels that may generate energy and cost savings
- investment in new facilities that use appropriate materials and construction processes
- potential for reductions in energy costs and carbon emissions generated by the design concepts
- income generation through new facilities

- engage with stakeholders by seeking their involvement in evaluating concepts at this early-stage planning for redevelopment
- findings of early-stage analysis will position LOPC to work with regeneration/innovation funds and partners

3.2 Site Analysis

Key factors identified for considering the breadth of net zero and carbon neutral options were related to

- site flood projections
- site buildings
- uses and accessibility
- opportunities of collaborations

These factors then resulted in identifying a number of net zero / carbon neutral initiatives that could be considered on site (integrated into the Design Concept section 4 of this report)

3.2.1 Site Flood Projections (Table 1)

Research explored a number of site related factors

- site orientation meaning potential for roof mounted solar panels on existing building orientation is limited
- nature of flood plain and flooding patterns
- projections of flood risk patterns over 50 years
- building proximity to river

Table 1 Site Flood Risk Evaluation

LOPC Site Flood Risk Evaluation (source: Environment Agency , 2022)
‘Rivers and the Sea’ - High Risk The site is considered to be at High Risk due to its proximity to a River or Sea. This means that each year this area has a chance of flooding of greater than 3.3%.
‘Surface Water’ - Medium Risk The site is considered to be at Medium Risk from heavy rain cannot drain away. Although it is difficult to predict as it depends on rainfall volume and location. This type of flooding is more widespread in areas with harder surfaces like concrete.

3.2.2 Site Buildings

Site buildings already demonstrate unique design concepts that have evolved from historical use, specifically the Swiss chalet A-frame concept (and related to it, the long since removed dry ski slope). Continuation of its unique identity is considered to be important to any future site development.

Research into site buildings identified risk factors that highlight the imperative for site development. A large amount of Asbestos containing material (ACM) - any material or object that, as part of its design or structure, contains one or more of the mineral silicates, is still present on the site in both workplaces and non-workplaces. Asbestos was noted to be contained within cement roofing (sheets and shingles), external wall cladding (including brick look cladding) and internal wall linings and ceiling linings.

The Royal Institution of Chartered Surveyors state that the life expectancy of an asbestos-based cement roof could be anything between 25-40 years, depending on environmental factors. Some versions of asbestos shingles were designed to have long-lasting quality, lasting up to 30-50 years. LOPC buildings were constructed in the 1950s, meaning the asbestos has been present for over 50 years on site. Furthermore, LOPC roof and walls are nearing the end of their expected lives. This leads to deterioration, panels can become porous and be prone to leaks, making it potentially hazardous.

Guidelines highlight that if asbestos is present and is likely to be disturbed by demolition or refurbishment work, **it must be removed**. In the case of demolition, it must be removed prior to work being undertaken. Removal work must be performed by an asbestos removal licence holder and/or their employees, who are trained and instructed to safely perform the removal work.

3.2.3 Uses and Accessibility

Research identified a range of issues related to current site layout, its usability and accessibility

- layout of facilities for inclusive activities and site coverage
- staff offices
- increasing user engagement whilst reducing emissions, waste and energy consumption
- enhancing user experience and opportunities for participation in activities eg., entertainment, concessions, refreshments, social events
- requirement for mixed use spaces within buildings
- changing facilities and personal lockers
- space for therapy/medical emergencies
- accessible and secure storage for equipment
- need for EC charging and parking, including staff parking
- need for pedestrian access into and across the site
- integrating national training centre facilities and activities with local community focussed activities
- retention of unique design features, reflecting historical significance of the site and its buildings
- empathy with local environment, including river, surrounding roads and housing, site entrance area
- commitment to site use arrangements (telecoms, Environment Agency)

- commitment to site-based organizations offering aligned services (eg., Paddle Plus, Soar Valley Canoe Club, Mosaic, Redhill Revolvers Field Pistol Club, Leicestershire Scouts, Lansdowne Dog Training Club)
- requirement to integrate recently developed infrastructure into new designs (docks)

3.2.4 Collaborations

Opportunities for collaboration were identified with two key stakeholders

- Leicester City Council (site lease owner)
- Environment Agency

Others identified related to sports activities and funding award bodies with whom LOPC has a track-record of collaborating, where net zero is integrated into core strategy for future activities.

3.3 Summary of Key Considerations for Design Concept Development

The most-likely cost-effective flood resilience strategy would be to raise the building, based on UK flood level projections and site topography maps research. Related risk factors identified were therefore integrated in the design development process. With this option selected, design considerations focussed on tools, techniques and materials that could be used to minimise health and environmental impacts and increase lifespan and lifecycle of the building. Design process therefore identified primary, secondary and tertiary aims.

3.3.1 Primary Design Aim

Primary aim of the design project was to integrate a flood resilient concept, prioritising net zero and sustainable strategies, fostering long-term sustainable development by building on environmental, social and economic strengths of LOPC and the site.

3.3.2 Secondary Design Aim

Given the commitment to existing collaborations and partnerships related to activities and services, the secondary design aim was to maintain space for these and to provide accommodation for new user groups.

3.3.3 Tertiary Aim

Reflecting LOPC core values, the tertiary aim is to embed the environment for outdoor adventure, community care, bonding, skills learning and teamwork.

4. Design Concepts

Based on preliminary research outlined in Section 3, this section describes the initial design concepts, flood resilience strategy adopted, sustainable design strategy and outlines the proposed scheme.

4.1 Design Inspiration

Design was inspired by three aspects of the LOPC site -

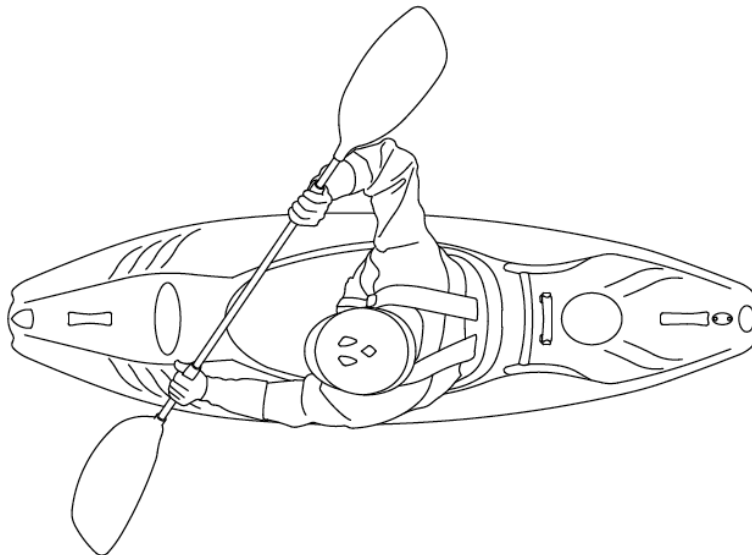
- its heritage as a Swiss chalet style (A-frame) building (illustrative Fig 1)

Fig 1 Illustrative example of a Swiss chalet



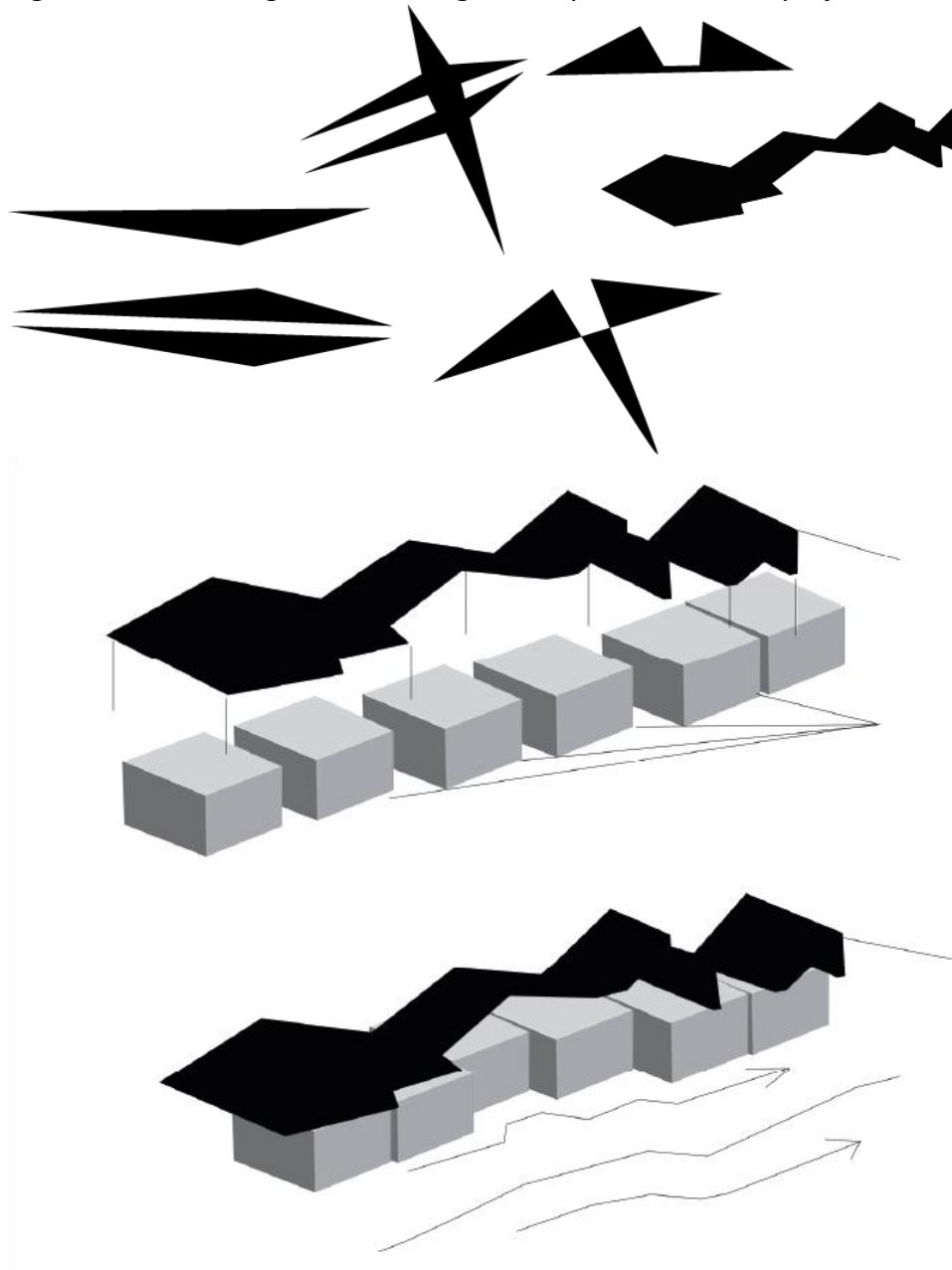
- the River Soar and its flow through the LOPC site
- the river-based sports activities that have taken place on the LOPC site throughout its history of kayaking and canoeing (illustrative Fig 2)

Fig 2 Illustrative example of a canoe



Therefore, the architectural design comprises components of the shapes derived from the abstracted geometric visualization of each part. Specifically, the design concepts informed the floor design and site layout, the roof structure design to create visual interest, the spatial uniqueness complementary to the river (see Fig 3 geometric design concepts used for the project).

Fig 3. Illustration of geometric design concepts used for the project



4.2 Flood Resilience Strategy

The LOPC site is a flood plain for Leicester and two possible strategies were considered: a floating building that adapts to site conditions, and a raised building. The second was considered to be more appropriate and cost effective. Other considerations related to the hierarchy of building and site design, which was aligned with a sequential approach to planning. These included construction measures that can be used to reduce the flooding risk at a site –

Flood avoidance: constructing a building and its surrounds (at site level) in such a way to avoid it being flooded eg., by raising it above flood level, re-siting outside flood risk area etc.

Flood resistance: constructing a building in such a way to prevent floodwater entering the building and damaging its fabric.

Flood resilience: constructing a building in such a way that although flood water may enter the building its impact is reduced ie., no permanent damage is caused, structural integrity is maintained and drying, and cleaning are facilitated.

Flood repairable: constructing a building in such a way that although flood water enters a building, elements that are damaged by flood water can be easily repaired or replaced. This is also a form of flood resilience.

Water exclusions and entry strategy can be achieved by adopting flood resistant design techniques to prevent water from entering the building and incorporating flood resilient materials to minimise resulting damage in the event of future flooding. The use of flood resistance and resilience as a strategy will enhance the ability of the LOPC facilities to prevent damage and help it to recover from damage, achieving net zero/carbon negative aims.

Design proposals therefore sought to consider how to prevent catastrophic flooding into the building by raising floor level above 450mm ie., 900cm above the average river level, and above the predicted height of future flood levels (as per evaluation). Note: 900cm is also considered to be an optimum height for wheelchair ramp access to the foyer and floor level of the buildings.

4.3 Sustainable Design Strategy

A number of considerations were integrated into the sustainable design strategy relating to the buildings, the site management and its usability.

The design of the building considers the impact human activity has on the environment by using an eco-friendly approach with the objectives of achieving energy efficiency, positive impacts on health, comfort, and improved liveability for inhabitants. Fundamentally, sustainable design will at the early stages consider existing elements and conditions on the site. Followed by making effective choices for the planning, construction, building materials and the implementation of appropriate technologies within the building for heating, cooling, and ventilation systems

4.3.1 Buildings

While aiming to design a building that produces at least as much energy as it consumes to achieve the net-zero aims, the conceptual design proposal considered the following -

- use of renewable, recycled or upcycled materials like wood, bamboo, and cork as a replacement for conventional materials like concrete. Coupled with the use of the flood resistant materials which can last in contact with flood waters many hours without significant damage.
- design harnesses existing site conditions and turns them into design opportunities to take full advantage of any natural sources of heating and cooling and ventilation such as the orientation of the sun and general wind direction.
- flood mitigation acts as an important sustainable design strategy because flooding presents a great risk to the health and wellbeing of inhabitants, and the lifespan of the building on site. Flood mitigation has been achieved by elevating the building above projected flood levels to minimise damage if a flood does occur. The buildings can be raised on columns or stilts, or the solid foundation being raised higher.
- reducing energy consumption by employing the use of renewable energy sources such as solar panels. The design also considered the feasibility of introducing a renewable energy system on to the site such as a biomass boiler, ground source heat pump, domestic wind turbine etc.
- introducing water conservation systems such as rainwater collection and recycling Greywater for use on site.
- incorporating plants and nature via a vertical Green Wall to help cool the building during summer months and create a healthy environment for humans.

4.3.2 Equipment Storage

While increasing capacity for activities and site visitors in the concept design, the same is done for equipment by providing multiple dedicated storage spaces throughout the design. This includes -

- Canoes and kayaks - two large spaces have been designed positioned close to the existing docks for ease of taking boats on and off the water.
- Additional storage - further spaces include storage in Block B & C for staff gear, children's gear and equipment or tools that will be required for the range of activities undertaken across the site.

4.3.3 Other external facilities

Other external facilities relate to -

- the introduction of an effective waste management system on site to reduce and avoid the amount of single-use plastic products along with increasing the amount recycled at the same time. The design is complete with multiple waste disposal sites around the site which includes the recycling of paper, plastics and organic and biodegradable waste such as vegetation and food waste to reduce the amount of waste going to landfill.

- The design promotes sustainability by introducing features that promote good practice and increased uptake in electric vehicles which do not emit greenhouse gases has increased the spread of charging points. The parking facilities include a number of electric charging stations which can service members of the public.
- Rainwater harvesting is incorporated into the design because it reduces pressure on public water utilities and infrastructure. It includes the collection and storage of rainwater running off a roof surface, through a gutter system and passes it into a storage vessel. The water can be used for a wide variety of non-drinking purposes including WC flushing, laundry, irrigation, and vehicle washing.

4.4 Proposed Scheme

The proposed scheme is comprised of three blocks each serving different user groups and functions. Functions are grouped by a safety hierarchy of Public, Semi-Private and Private Spaces which allows for the introduction of the public onto the site without compromising the safety of school children.

Three blocks have been designed, identified as A, B and C based on their position on the site (A closest to road) -

- Block A – Revenue Generation
- Block B – Admin & Indoor Activities
- Block C – School Group & Site Members

The design ethos draws on the following -

- inclusive design strategy – by incorporating and building on its sporting and leisure heritage the design concept positions LOPC as a nationally leading center and landmark, with the capacity to continue fulfilling its existing charity aims and objects while offering world-class facilities to host national sporting tournaments or training camps.
- planning, funding and operation strategy – the concept design is proposed as a phased construction plan meaning the development and construction works can be planned and broken down into a series of phases, rather than one continuous process. The scale of the development can be dependent on funding secured for the development. In this case, the project can be divided into three smaller projects for Block A, Block B and Block C over a period of years. The phased construction plan will allow for lower initial investment into the project. Income can continue to be generated throughout the construction period and the site can continue to be occupied during the middle and later stages of the development.

4.4.1 Site

Use and accessibility are core to the design – the proposed concept is inclusive of the needs of the site users. This includes target users, users outside of the target demographic, users with disabilities and users from diverse cultures. The site design

features complete access and circulation for wheelchair users across all three blocks and the capacity for including gender neutral changing villages.

Raised ground and floor level of buildings - the concept design offers increased capacity with a mixture of indoor and outdoor activities that appeal to a diverse audience and user groups. The raised levels means the site is more resilient to flooding, providing an opportunity for activities to continue over an extended period of the year.

Separation of pedestrian public from vehicles – the proposed extended parking facilities will accommodate visitors on site and a new pedestrian access ramp will further separate pedestrians and vehicles to ensure the safety of pedestrians.

Site-wide design - the concept design also considers the 15 acres area on which the buildings operate. The plan reconceptualizes the range of activities that can be offered on site, introducing a number of new schemes and activities alongside the existing activities through which it is intended to preserve existing partnerships and relationships the LOPC has while opening the site up to new user groups, site users and partner organizations (see Table 2).

Table 2 Existing and new site-wide activities integrated into design concept

Existing Site Activities	Additional Proposed Site Activities
High-ropes course	Picnic area
Zip line	Air-soft range
Outdoor classroom	Paint-ball range
Bushcraft	Axe throwing
Archery	Orienteering base camp
Air rifle / pistol ranges	Modular cabin concept
	Community garden project

4.4.2 Block A

It is proposed that this could be a second phase build, with accommodation for current independent units integrated into Block B as the potential first phase of the build in the interim.

This block is intended to replace the current independent units and formalize space offered to those organizations as well as increase capacity for new partnerships. This block is proposed as a standalone block with potential for revenue generation. It includes the following rooms and amenities -

- General offices
- Private offices
- Meeting rooms overlooking the river
- Kitchenette

4.4.3 Block B

It is proposed this block is the preliminary phase of development.

This block is proposed as a replacement for existing staff accommodation, visitor facilities and toilets. The accommodation for staff is increased and upgraded, and the facilities for hire are extended to allow for extended operational and income generating activities. It includes the following rooms and amenities -

- Integrated space for Soar Valley Canoe Club & Puddle Plus Club eg., (pre – Block A)
- Canoe and kayak storage (positioned close to existing dock)
- Changing spaces
- Kitchenette and break room
- Coffee lounge (with outdoor deck and seating overlooking the river)
- Welcome area/reception
- Male & female guest toilets
- Male & female staff changing & showers
- General offices, private offices, meeting room, kitchenette and break room
- Gear and equipment storage
- First-aid room
- Mix of small, medium, and large multi-use spaces with kitchen and storage
- Multi-use outdoor canopy area
- Indoor gymnasium for climbing wall for speed climbing

4.4.4 Block C

This block is new accommodation and is proposed for site members and school groups to build capacity at the site and across a breadth of operations. It includes the following rooms and amenities -

- Male and female members toilets, changing and showers
- Accommodation
- Common room
- Gymnasium
- Offices

This is the final phase of development.

4.4.5 Cabin

An additional concept proposal is a modular cabin based on the same abstracted geometry as the proposed buildings on site. The design is a timber frame which can be extended to different sizes based on need and capacity, including bi-folding doors, which may allow the cabin to be opened in the warm summer months or closed in cold winter months. The cabin includes waste water and toilet facilities. It can be used for a range of activities, such as the following purposes -

- Meeting point for different activities taking place on site
- Shelter further along the site
- Camping pod/cabins

- Outdoor classroom
- Storage

5. Stakeholder Evaluation of Design Concepts

5.1 Methodology

Research design for this project involved mixed methods, primarily qualitative focus groups and interviews, supplemented with a survey using open-ended questions. The methods were selected because the aim of the project was to generate 'rich insight' into stakeholder evaluation of the design concepts developed. The design concepts were used as a stimulus through which feedback was derived.

5.1.1 Research Process

Using feedback derived from discussions and site visits, design concepts were developed and refined in consultation with LOPC Centre Manager. The preliminary design concepts were then presented to LOPC Board of Trustees meeting on 9th March 2022 and feedback further integrated into the design concept. The final designs were then included in a presentation which was either given as a live in-person event or recorded and made accessible to research participants via a streaming link. The presentation explained the project, the design concept and the proposal for potential site development (a copy of the 15 minutes presentation and the recording is added to this report).

The presentation was used as the premise for focussed discussions (groups and interviews). With online discussions and interviews, participants were contacted with a link to the presentation prior to the meeting.

Subsequent to focus group discussions and interviews, analysis of data collected enabled researchers to develop a short questionnaire instrument to collect data from stakeholders who had been unable to attend group discussions or interviews.

5.1.2 Data Collection and Analysis

Data was collected between March 2022 and May 2022.

Focus groups and interviews were audio recorded. All participants were assigned a categorical and numerical ID to protect anonymity of data collected (see Sample 5.1.3 below). Permission was formally sought from all research participants as part of the preliminary recruitment and briefing process at meetings (see 5.1.4 Ethics below). Focus groups and interviews lasted approximately 50 minutes, including 15 minutes presentation/briefing for in-person, and 40 minutes approximately for online.

Interviews were transcribed to facilitate data analysis. Thematic content analysis was used to identify key themes in discussions and interviews.

Questionnaire data was summarized using tables. Open-ended answers to questions were similarly analysed using thematic content analysis to identify key themes.

Note: Data collection instruments for the project can be found in a separate folder on Figshare.

5.1.3 Sample

Stakeholder population (total potential sample) was identified by LOPC and categorised into five key categories (see Table 3).

Table 3 Stakeholder sample description

Category	Description	Population total
1	Representatives of key partners and community groups based at LOPC or who use LOPC as their primary activities centre	39
2	People who are closely associated with LOPC activities, including members of staff, former members of staff, volunteers, trustees and key active groups	82
3	People who are active users of LOPC site or have a business relationship with the site	71
3a	Councillors (Leicester and Shire) - not contacted for this project	233
4	Youth, school and community group leaders who have used LOPC in the past for community group activities	75
5	Individuals and group leads who have hired facilities at LOPC for personally organized events least frequently	175

Data was primarily collected for category 1 was by interview, categories 2 and 3 by focus group, and categories 4 and 5 by survey. At this stage of the project, it was decided that only those members the most relevant individuals of Category 3a would be contacted, including Council representatives with a direct interest in tourism and related services.

Target participants were contacted by the Centre Manager in some instances and directly by the researchers in other instances. Response rate was particularly challenging in categories 3, 4 and 5. In category 3, it was noted that one challenge was likely to be time available to members of school teams to respond to requests

for interviews. Alternative methods of contacting were considered but take-up was unsuccessful.

Response rate for each category is summarized in Table 4.

Table 4 Sample response rates

Category	Interviews Number (%)	Focus Group Number (%)	Survey Number (%)
1	2 (5.1%)	7 (18%)	0
2	0	32 (39%)	1 (1.2%)
3	0	2 (2.8%)	0
4*	0	0	4 (5.3%)
5	0	0	0

*The response rate for these categories was problematic for any quantitative analysis of data collected, however open-ended responses were useful.

5.1.4 Ethics

Preliminary ethical approval for the project had been sought from De Montfort University's Ethics Committee at the grant application stage of the research process (July 2021). The final and detailed ethical approval which included a peer review process for each of the research data collection instruments used (participant information sheet, semi-structured interview questions, survey questions) was completed under reference number 427464 once the grant had been received and the project commenced (November 2021-March 2022).

Details of the De Montfort University's ethics Code of Practice can be found at <https://www.dmu.ac.uk/documents/research-documents/dmu-research-ethics-cop-v2-sept-2021.pdf>

5.2 Findings

Findings identified a number of areas for consideration including usage, net zero, building and site design with implications for the site, business and community development.

Overall, the feedback from evaluation by stakeholder groups was that the proposed design concept was positive. It would potentially give LOPC a unique identity in the city and possibly become a local/national visual landmark, albeit a number of key business decisions (target users, business growth, operation and partnerships) need to be made in order to address implications.

5.2.1 Additional areas for consideration identified by stakeholders

Usage

Closely aligned to current/plans	Loosely aligned to current/plans
Drying rooms for staff gear and equipment	Re-introducing a dry ski slope back onto the site
Wellness retreats (with outdoor camping pods), incl meditation, pilates, yoga	Bike riding, storage and access to trails (linked to city infrastructure) including hire & storage
Retail space (activity related store), may be contracted to third party	Maze/sensory foot trails on site
Garden allotments for rent/purchase	Balls, parties and banqueting
Physiotherapy facilities	Extending pond for additional uses
Skills groups for climbing and additional activities	Canal moorings for temporary visiting boats
Using room dividers that enable internal facilities to be scaled up/down or have multiple simultaneous uses	Quad bikes for site tours
Prayer room (multi-faith)	Children's play area (eg., sandpit, playground)
Conferencing	Picnic areas
Children's jetty	Pontoon for all year access to water
Assault course (army style)	Petting zoo
Keep fit classes / outdoor gym / water gym	Convertible space for emergencies eg., refugees
	Self-service technology for greater access
	Open more of the site to more user groups – access tracks
	Indoor tennis

Net zero

Closely aligned to current/plans	Loosely aligned to current/plans
Increased roofing space for solar panels and service usage	Ground source heat pumps
Domestic wind turbine	Biomass boiler – elephant grass (miscanthus)
Driving design which promotes good practice and behaviour that is net zero	Electric bike & scooter hire – to and from the site (linking with wider city infrastructure)
Increased recycling points across the site	Connect with National Forest for sustainable tourism and accommodation

Stronger partnership with Canal and Rivers Trust	Creating links through the topic of sustainability/net zero theme with Space Centre, University of Leicester and others
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Site design

Closely aligned to current/plans	Loosely aligned to current/plans
A bigger and more welcoming reception area	Indoor restaurant space that overlooks the river
Barrier system to control entry into the site for safeguarding and for separating general public visitors to more open areas of site (eg., reception, café, shop)	Indoor bridge between Block A and B
Pathway access for wheelchair, electric wheelchair users or those with less mobility	Review 'urban look' to be more 'rural', it is important to design something that will visually fit in with the site
Making pedestrian access onto the site much clearer and signposted	The size/height of the concept proposal should encourage more visibility from the (currently occluded) dual carriageway
Provision for profound & multiple learning disabilities (PMLD)	Changing station to accommodate wider user needs/preferences
Cycle & E-bike storage would enable proximity to city infrastructure	
Sensory activities – sensory rooms and interactive spaces	
Light control needed for more windows	

5.2.2 Implications of design concept considerations identified by stakeholders

An overarching theme identified was that all potential impacts on LOPC from site development will be likely to necessitate it to have a different approach (and business model) to its business operations for which it currently has little experience and expertise.

Usage (incl net zero & design)

Positive implications	Negative implications
Multi-use spaces can be hired out to third party groups	Environment Agency/City Council support for increased site building and car parking footprint for new uses
Potential for more local community engagement	Expanding car park reduces green space area

Increased range of activities may appeal to whole families and wider age range of users eg., toddlers, children & adults	Cutting down trees to move Bush Craft area
Modular cabin concept will allow for electricity points across the site	Need for additional safeguarding to manage wider site usage by new groups of users
Frontage of site and design can be used as billboard for advertising	Flood impacts on any new activities eg., community garden
Indoor climbing will facilitate partnerships with national and international organisations	Balancing public access vs LOPC organized spaces for user groups
Commercial site activities may realize new investment and sponsorships opportunities as well as generate additional revenue	Costs and footprint of changing station accommodation vs standard design (and throughput of customers to facilities)
Increasing usability of blocks by connecting them more closely (pedestrian access)	

Business

Positive implications	Negative implications
Staged development proposal may work well for LOPC and fund-raising	Current community vs new groups of users change site use pressures and need to be evaluated
Introducing new activities (increased opportunity for existing) provide potential for partnerships with local, national, international organisations, including sports-related, welfare, childcare, outdoor, etc.	Change of business organization (structure) may be required to operate more commercially for revenue generating activities – how can capacity be increased without impacting staffing incl instructors?
Introducing commercial activities (eg., shop, café, conferencing) will generate revenue and bring more people on to the site	Staffing and resource cost, and management for additional activities – increased operating cost
Introduction of a postcode variable membership fee can support prioritising local community	Down time during site development to achieve the scheme (including for each of the stages of development)
Provides strong links between health, wellness and outdoor pursuits initiatives in the city eg., mental and physical wellness strategy	Current lack of business development skills within LOPC

New activities will spread potential for revenue generation across the operating year	
Potential for stronger links with local business community, supporting city with Visit Leics promotional campaign (Tourism etc)	

Community

Positive implications	Negative implications
Attractive to more potential user groups	Prioritizing strategy for accommodating different groups needed eg., local vs regional/national, special needs, etc.
New uses identified are aligned with existing charitable and community related activities	
Net zero strategy results in lower costs meaning more spend on core activities for community groups	

Partnerships

Positive implications	Negative implications
New partnerships increase opportunities for business growth	No strategic business relationship management integrated into operations to develop key stakeholders for realizing income generation
Building on existing partnerships strengthens LOPC's position in the city and region, including among key stakeholder groups	
Key stakeholder groups will hold LOPC in stronger regard as a strategic partner to their own operations (eg., LCC)	

6. Actions and Outcomes

During the project development phase, Leicester City Council was identified as a key stakeholder group which was contacted separately by the Centre Manager (following preliminary introduction). The contact resulted in three project related outcomes: mayoral and councillor site visit; joining the Leicester Tourism Strategy Group; and, set up of meeting with City Planners to discuss site development next steps.

Alongside this, findings of analysis from stakeholder feedback enabled the preliminary design concepts to be further refined.

6.1 Leicester City Council

6.1.2 Mayoral Site Visit

A site visit took place on 22 April 2022. At the meeting, the preliminary site design plans were presented and discussed. Present with Zainab Mohammed and Stuart Fraser were:

Sir Peter Soulsby (City Mayor)

Mike Dalzell (Director of Tourism, Culture and Investment)

Cllr Piara Singh-Clair (Deputy City Mayor with responsibility for Culture, Leisure, Sport & Regulatory Services)

The outcome of the visit was for the visitors to effect introductions to a broader range of city-wide stakeholders working to support development of the tourism infrastructure in Leicester.

6.1.2 Leicester Tourism Strategy Group

An outcome of the mayoral visit was an invitation to formally join the board of the Leicester Tourism Strategy Group. The first meeting is scheduled to take place in September 2022.

6.1.3 City Planners

An outcome from the mayoral visit was a preliminary meeting with Leicester City Council planners to discuss the proposed future development, explore approaches to dealing with key issues such as the Environment Agency concerns. A meeting that had been scheduled to take place on 7 July 2022 was pushed back to later in the year, date at the end of the project tbc.

6.2 Revised Concept Designs

Following the stakeholder evaluation process, key changes to design concepts were made as follows (see Appendix 2, separate folder marked Appendices on Figshare) -

6.2.1 Block A

- Kitchenette and break room
- Meeting room overlooking the river

6.2.2 Block B

Additional and updated facilities / amenities -

- Gear and Equipment Retail Group
- Dry Room
- Safety turnstile installed to control entrance into Block B
- Covering for the outdoor canopy area to reduce draft and wind during colder months to extend its usefulness for year-round activities/hire

6.2.3 Block C

Additional and updated facilities / amenities -

- Canoe and kayak storage (positioned close to existing dock)
- Increasing the size of multi-use gymnasium
- Gear and equipment storage
- Removal of accommodation facilities

7. Conclusions and Recommendations

7.1 Conclusions

The project has developed and evaluated concept designs for new LOPC facilities that integrate its net zero/carbon negative goals. The design concepts have been evaluated by exploring the views of LOPC's identified key stakeholder groups. Research findings highlight overall support for the vision to develop an iconic building that has potential to raise the profile of LOPC certainly at local and regional level, and potentially at international level. Importantly, the new site should be able to generate new income streams for the business. The project therefore provides baseline consultative information that may inform the future development of LOPC.

The abstracted geometric design concepts adopted for the proposed buildings drew inspiration from three key aspects of LOPC's heritage in the city: its location on the River Soar site; its core river-based activities; and, the architectural design of its buildings (A-frame Swiss chalet). Although the existing building/s do not have listed status, it has nonetheless become an iconic part of LOPC's image within living memory of its oldest users and trustees. Furthermore, evaluation of predicted climate related changes to the River Soar flow have influenced where and how the new building/s may need to be located and changed in order for LOPC to become more resilient to flooding and to reduce the risk of potential damage to buildings and the business as a consequence. Specifically, the design has integrated flood resilience and prioritised net zero and sustainability strategies for the site. Concepts have also integrated LOPC's commitment to existing collaborations and partnerships for activities and services. Space has been included for existing activities alongside accommodation for new user groups that collectively reflect its core values as an

environment for outdoor adventure, community care, bonding, skills learning and teamwork.

The background research for design concept development highlighted an important near future issue that needs to be managed by LOPC. This is the process of managing the end of life of current buildings on the LOPC site, including implications for Leicester City Council and the Environment Agency in terms of building disposal, site management and contractual obligations.

The project has identified how incremental redevelopment may be achieved by including a staged construction of new buildings. Proposed new building B is the priority for accommodating existing activities; building A extends facilities for hire to new stakeholders to provide secure income for the business; and, building C extends activities to more user groups to increase capacity of the business operations. Alongside these, a cabin that could be positioned in a variety of locations across the site may be used to extend site usage overall. The strategy may therefore provide an opportunity to scale growth over an extended timescale eg., a period of between 5-10 years, whilst achieving net zero goals. The strategy also enables LOPC to scale its income generating activities over time which may support its redevelopment strategy.

Stakeholder consultation on the design concepts and site developments enabled a breadth of user groups to critically reflect upon LOPC's current proposition in new ways. Employees including instructors, trustees and current LOPC customer groups and users were consulted in a series of focus group discussions, interviews and via survey. The open nature of the consultation process enabled people to engage in brainstorming potential new activities that the business may consider. Overall, a series of potential new activities have been identified some of which closely align with current business activities. A further set of ideas have been identified that peripherally relate to current activities but which may be worth further consideration. Any integration of the suggestions made through the consultation process will influence future usage of the site, LOPC's net zero goals and site layout considerations. Activities also have potential implications on how user groups access the site, how the business operates, LOPC's relationships with its communities and its potential partnerships. It is therefore necessary for LOPC to consider the research findings in relation to the strategic business goals it has by further evaluating how new activities may benefit the organisation, for example, in terms of income generation, organizational trading and charitable status, community engagement and position within the city's overarching tourism and wellbeing strategy for citizens.

In sum, the process of developing conceptual designs has given LOPC a clear opportunity to think about its future development trajectory. Modelling existing and projected new income streams will, however, be required in order to better understand income and operational costs at different stages of development in order to take the outcomes of this project to the next stage.

7.2 Recommendations

- 7.2.1 LOPC/BoT to evaluate the research findings and suggested ideas for business development.
- 7.2.2 LOPC to model income from a wider range of activities as per outcomes of the preliminary evaluation of the research findings.
- 7.2.3 Based on review of income modelling, BoT must reflect on organizational status including stated aims and objectives of the charity.
- 7.2.4 LOPC to develop a business plan that will support its position for funding the new development. This includes business growth strategy and identifying when funding for development related activities will be required (eg., planning application, building works, etc).
- 7.2.5 LOPC to explore with Leicester City Council how the site may be managed for end of life of current buildings as well as future development to achieve the net zero aims and ambitions of the organization, and to support its strategic position within Leicester's infrastructure and policy plans.
- 7.2.6 LOPC to begin exploring target partners' relocation to/sponsorship of LOPC, based on outcomes of research findings evaluation by LOPC.
- 7.2.7 LOPC to develop and maintain a marketing and communications strategy that facilitates a strong relationship with local community groups in preparation for site redevelopment planning process.

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