JBA Trust Limited

Annual Report 2021-22

Charity Number: 1150278

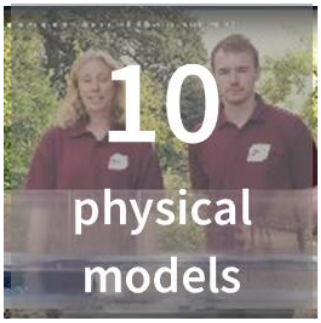
Company Number: 07840801

Highlights of the first 10 years of JBA Trust's charitable activities

300
flood risk & STEM education events

54,000
YouTube subscribers

110
scholarships and **bursaries** with funding



33,000
hours donated

Worked with
22
universities

50
MSc projects and placement students

Cover photo: An intricate maze of small lakes and waterways in the Yukon Delta at the confluence of Alaska's Yukon and Kuskokwim Rivers with the Bering Sea (Credit: United States Geological Survey on Unsplash). We are supporting three PhDs that use earth observation data to understand environmental processes including coastal erosion and flooding extents: PhD students: JBA Trust

Director's Report

This year we entered our second decade, and, with the easing of Covid-19 restrictions in the UK, we took the opportunity to celebrate our first 10 years with some of our project partners. Over our first decade, we have helped 127 students with funding for postgraduate training and research, supported over 300 engagement events and worked with 22 universities and nine NGOs. Our digital resources have been viewed more than 35 million times by people around the world.

We have always emphasised the sharing of knowledge as our core mission. Sharing encompasses the creation and applications of knowledge by people and organisations, as well as its communication.

We look to bring quality to each of the steps in this knowledge-sharing process. Our support has helped to deliver 39 peer-reviewed scientific publications and numerous presentations at technical scientific and industry conferences. We have worked with partners to encourage STEM learning and help young people to see opportunities for careers that will ultimately help to make our society more resilient and sustainable.

The trustees recognise that the sectors we work in, environmental sciences, environmental non-profit and engineering, are often not fully representative of the society we live in. We have begun to focus more attention on these issues of representation and equity. At the same time, our work is evolving to include resilience and sustainability as core concepts.

We are a corporate foundation, and most of our resources are donated by our sponsors, the JBA Group of companies. I have always believed that our most important contributions to public benefit come from the people across JBA who support us. Over our first 10 years, we have facilitated more than 33,000 hours of work by JBA colleagues to help share their knowledge and expertise, for which I and the trustees are, as ever, most grateful. We also thank the many partners we work with collaboratively, helping us to deliver on our charitable objectives.

Rob Lamb, Managing Director

Contents

1 Our purpose and activities

JBA Trust is a charity established and funded by the JBA Group of companies. We aim to help improve resilience to environmental risks by sharing knowledge. We do this by enabling research, education and engagement.

We work with academic researchers, NGOs, charities and the JBA Group of companies in four key areas:

- Facilitating collaboration between academia and industry to deliver high quality scientific research.
- Publishing and disseminating knowledge, enabling shared understanding and good practice.
- Supporting post-graduate training by providing technical expertise and financial bursaries for MSc and PhD studentships.
- Engaging with schools, charities and voluntary groups to share inspiration and learning resources.

This annual report reviews the activities of the JBA Trust over the past year and how our work has delivered public benefit.

2 Science and research

We aim to facilitate collaboration between academia and industry to deliver scientific research that improves society's understanding and management of risks in the water environment. By publishing and disseminating the resulting research outputs, we enable knowledge exchange and share best practice.

Collaborative research

In 2021-22 we worked with universities, research institutions, public sector and charitable organisations. The highlights and outputs of our collaborative research projects are summarised below.

UK Flood Hydrology Roadmap

The flood hydrology roadmap is a 25-year vision and plan to advance all aspects of flood hydrology in the United Kingdom. It has been developed with inputs from more than 270 individuals from 50 organisations working in hydrology, flood management and related topics.

We have supported the roadmap project since it started in 2018 through membership of its steering group and by contributing to publications and presentations.

This year we co-authored a paper about the roadmap, **“The future of flood hydrology in the UK”**, which was published in the journal Hydrology Research. In September 2022, we also presented at the Global Flood Partnership meeting in Leeds and the British Hydrological Society symposium in Lancaster.

Research outputs	Type	Link
Flood hydrology roadmap	Project summary and documents	https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/flood-hydrology-roadmap
The future of flood hydrology in the UK	Journal Paper	https://doi.org/10.2166/nh.2022.053

Natural Flood Management manual

CIRIA's natural flood management manual (C802) was launched in May 2022. We provided sponsorship and technical support throughout the project.

The manual covers the delivery of natural flood management (NFM) from problem identification through conception, funding, design, construction, inspection, maintenance, adaptive management to end-of-life considerations. It aims to provide confidence in NFM delivery, recognising that innovation in this area is constantly emerging.

Research outputs	Type	Link
Natural flood management manual	Guidance report	https://www.ciria.org/ItemDetail?iProductCode=C802F&Category=FREEPUBS

Yorkshire iCASP

iCASP is a 5-year programme that aims to build on Natural Environment Research Council (NERC) -funded science in climate change, flooding, integrated catchment management, carbon storage in soils, water quality and water resources to generate economic, societal and environmental benefits in rural and urban areas of Yorkshire. It is led by the Universities of Leeds, Sheffield and York, and the National Centre for Atmospheric Science. JBA Trust are a 'springboard' partner on the governance panel, along with industry, NGOs and government.

This year, Water@Leeds and iCASP commissioned a scoping study to explore the potential for a 'Broughton Hall Research Hub' to enable and deliver research, knowledge exchange and education. The Broughton Hall Estate covers approximately 3,000 acres of land including moorland, parkland, improved meadow pastures, woodland and floodplain, and is undergoing a transformative rewilding programme on one-third of the land. We are helping identify research, education and engagement opportunities.

Tree planting in progress on the Broughton Estate (Credit: Duncan Faulkner)

NERC Natural Flood Management research programme

This four-year £4 million programme has investigated the suitability and effectiveness of working with natural processes to reduce flood risk in different environments around England. Funded by NERC, it has three projects each with a different focus: LANDWISE (land use and soil management), Protect NFM (upland headwater restoration), and Q-NFM (quantifying effectiveness of NFM for mitigating flood risk).

We have supported the Q-NFM and LANDWISE projects by participating in research activities and in an advisory capacity, and this year made contributions to a paper published in the journal Hydrological Processes.

Research outputs	Type	Link
Using micro-catchment experiments for multi-local scale modelling of nature-based solutions	Journal paper	https://doi.org/10.1002/hyp.14418

Doctoral research projects

Our collaboration with universities across the UK enables us to support graduate researchers (research students) working on doctoral projects to develop advanced skills and deliver high quality research that helps enhance the understanding of a wide range of risks in the environment.

We support doctoral researchers through a variety of programmes including doctoral training centres funded by UK Research and Innovation (UKRI).

This year, we were delighted to see another two graduate researchers, Zora van Leeuwen and Jake Grainger, successfully complete their PhDs. We also welcomed three new PhD students to our programme to undertake research on a broad range of topics that will help improve our understanding and mitigation of environmental risks:

- **Tharindu Manamperi**, studying at Swansea University, is investigating how artificial intelligence (AI) platforms can predict the evolution of coastal erosion.
- **Adam Wood**, studying at the University of the West of England, is researching social justice in local flood resilience.
- **Ben Bluck**, studying at the University of Southampton, is investigating the impact of artificial light on fish passage through culverts.

More information about all our PhD projects can be found at: https://www.jbatrust.org/who-we-help/phd-students/

PhD project outputs

We are pleased to be able to share outputs of the projects, including peer reviewed publications.

- Helen Hooker, studying at Reading University, published her first paper in the Journal of Hydrology on 'Analysis of 2D inundation patterns to identify skilful scales of comparison'. The paper is openly available at: https://doi.org/10.1016/j.jhydrol.2022.128170
- Luke Jenkins, studying at the University of Southampton, published his first paper in Natural Hazards on 'The temporal clustering of storm surge, wave height, and high sea level exceedances around the UK coastline'. The paper is openly available at: https://link.springer.com/article/10.1007/s11069-022-05617-z

3 Research publication summary

During the year, we supported and co-authored studies published as papers in peer-reviewed scientific journals. The peer review process can be lengthy, and so some of these papers report on research activity carried out in previous years.

Title and link	Journal	Authors	Status
Invited perspectives: Challenges and future directions in improving bridge flood resilience	Natural Hazards and Earth System Sciences	Tubaldi, E et al + JBA Trust co-author	Published
Prediction of flood quantiles at ungauged catchments for the contiguous USA using Artificial Neural Networks	Hydrology Research	Filipova, V. et al + JBA Trust co-author	Published
Using micro-catchment experiments for multi-local scale modelling of nature-based solutions	Hydrological Processes	Hankin, B et al + JBA Trust co-author	Published
Spatial scale evaluation of forecast flood inundation maps	Journal of Hydrology	Hooker, H. et al.	Published
The temporal clustering of storm surge, wave height, and high sea level exceedances around the UK coastline	Natural Hazards	Jenkins, L.J., Haigh, I.D., Camus, P. et al. + JBA Trust co-author	Published
Geomorphic effects of natural flood management woody dams in upland streams	River Research and Applications	Lo, H. W., van Leeuwen, Z., Klaar, M., Woulds, C., & Smith, M.	Published
The future of flood hydrology in the UK	Hydrology Research	Lamb, R. et al	Published

4 Support for students in higher education

There are many academic subjects that generate the knowledge and understanding needed to manage risks in our environment. Whilst undergraduate courses such as Geography and Environmental or Physical Sciences are important, the relevant specialist training often comes into greater focus at postgraduate (masters or doctoral) level. We therefore emphasise support for students and projects at this level.

The British Hydrological Society, JBA Trust and Environment Agency Studentship Awards

In 2021-22 we continued our partnership established in 2011 with the British Hydrological Society (BHS) and the Environment Agency to support students working towards MSc (or equivalent level) qualifications in hydrology, water resources, catchment management and other related subjects.

This year we increased the value of the awards given the significant increase in the cost of living for postgraduate students. Ten bursaries of £2,500 were awarded and we have now supported 97 students since 2011.

Applications for these bursaries were managed using the web-based system that we developed in 2014 and have maintained since. This continued to work well and enabled us to coordinate the assessment process with the BHS and Environment Agency effectively.

This year we collected information on equality, diversity and inclusion (EDI) as part of the application process for the first time. The aim is to build an understanding of the diversity of recipients, alongside the partners' ambitions to ensure that the awards are inclusive.

Flood and Coastal Risk Management Scholarships

The challenges of more frequent extreme weather and new flood risk responsibilities mean that there is a growing need for skilled water and environmental risk management professionals. This year we continued to provide support through our scholarships to fully fund the tuition fees for Lancaster University's Flood and Coastal Risk Management Postgraduate Certificate course.

We awarded scholarships to Tomas Jonathan, a Flood Risk Analysis Advisor at Natural Resources Wales, and Liam Hall, a Project Manager at Rivers Ecology (part of Norfolk Rivers Trust).

> **"The PGCert offers me the chance to study with and learn from experts in coastal and flood risk management about the key technical and professional aspects of becoming a good flood modeller.**
>
> **The topics covered in the course are directly related to my current role and I strongly believe the support from JBA Trust will not only benefit my understanding and knowledge, but that of my co-workers and the service we provide to the public."**
>
> - Tomas Jonathan, 2022 PGCert Scholarship recipient

Masters projects

We helped to provide MSc (or equivalent degree level) students with placements, technical expertise and access to software resources and case study data, as well as offering a platform for them to share highlights from their research projects. The students we help have gained insight into how methodologies and techniques are applied in industry and have an opportunity to see how they will be able to use their skills in a future career.

In 2021-22, we helped seven students from the Universities of Leeds, Birmingham and Lancaster. The students worked with support from our colleagues in the JBA Group of companies on a range of topics including modelling hydrological impacts of beaver reintroduction, measuring community resilience to climate change and flood forecasting.

5 Learning and engagement

We support a wide range of activities aimed at encouraging students at schools and universities to develop or enhance their interests in water and environmental management, which could also ultimately lead them to pursue careers in the field. Our learning and engagement activities also extend to the wider community, and to flood risk management professionals.

Physical models

Our physical models of catchments, rivers and coasts enable us to bring to life topics including flood risk, coastal and river engineering and nature-based solutions. Our collection includes four different sized hydraulic river flumes, four wave tanks, an AR (Augmented Reality) sandbox and a PARM (Projection Augmented Relief Model).

This year saw a big increase in demand from primary and secondary schools for engaging and interactive demonstrations using the physical models to support STEM (Science, Technology, Engineering and Maths) teaching and enrichment activities, including sessions as part of British Science Week. During 2021-22, the models supported a wide range of STEM engagement, including an Interactive Geography Day for 120 secondary school students focusing on flood risk management; and flood risk and water safety sessions with five primary schools.

Partnerships and learning resources

Our digital learning resources have elements of engineering, maths and geography included in each topic in the context of flood risk, water management, weather and climate. They are packaged by age group and include videos, worksheet activities, case studies and exercises.

All our learning resources can be accessed and downloaded at: www.jbatrust.org/how-we-help/learning-resources/.

In 2021-22, we worked with the following organisations to develop new learning resources and STEM initiatives to support engagement and education.

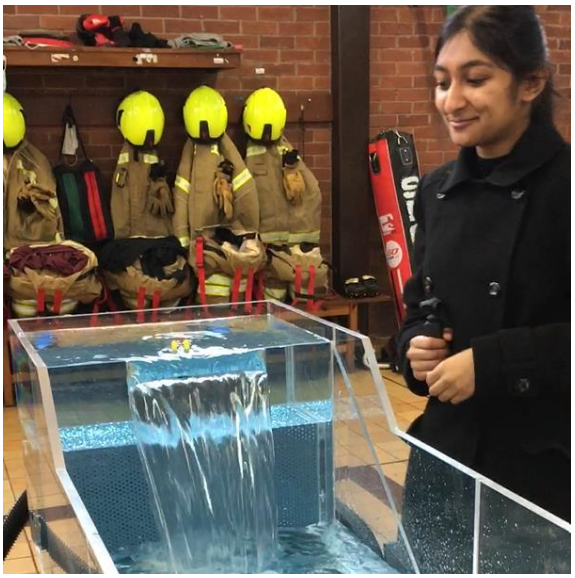
North Yorkshire Fire and Rescue Service (NYF&RS) - Water safety flume

We partnered with NYF&RS and Hydrotec to build a new model specifically focused on water safety around river features and engineered structures, for example strainers (culvert screens, debris), weirs and waterfalls.

The flume is supporting the work of the Safety and Prevention Officers (SPOs) who regularly visit schools and communities to raise awareness of the risks associated with swimming in rivers, canals and reservoirs. The SPOs have already delivered demonstrations to hundreds of people at schools, National Park visitor centres and county shows.

We also co-created a new educational water safety video featuring the flume, available at:

https://www.jbatrust.org/how-we-help/physical-models/water-safety-demonstration-flume/



Handing over the water safety flume (left) and testing the waterfall feature (right).

Institution of Civil Engineers (ICE) – CityZen competition

This year we worked with the ICE's Engagement and Inspiration Team to support a competition for 16-18 year-olds that focused on developing the infrastructure for a town within the context of climate change, flood risk and sustainability.

In 2021-22 over 300 schools took part in the competition 'CityZen' which was hosted within a specially designed gaming platform. We sponsored the First Prize (provision of a wave tank, training session and learning resources for the winning school) and contributed to the judging panel.

The winning entry can be seen at: ICE CityZen Award | Institution of Civil Engineers (ICE).

Lancaster University and the British Ecological Society – Nature-based Solutions

This year we worked with Lancaster University and the British Ecological Society to develop a new physical model that can show the impact of nature-based solutions (NBS) on flood risk, for example bunds, leaky barriers, roughness and moorland restoration. The model is designed to be interactive, off-grid and lightweight.

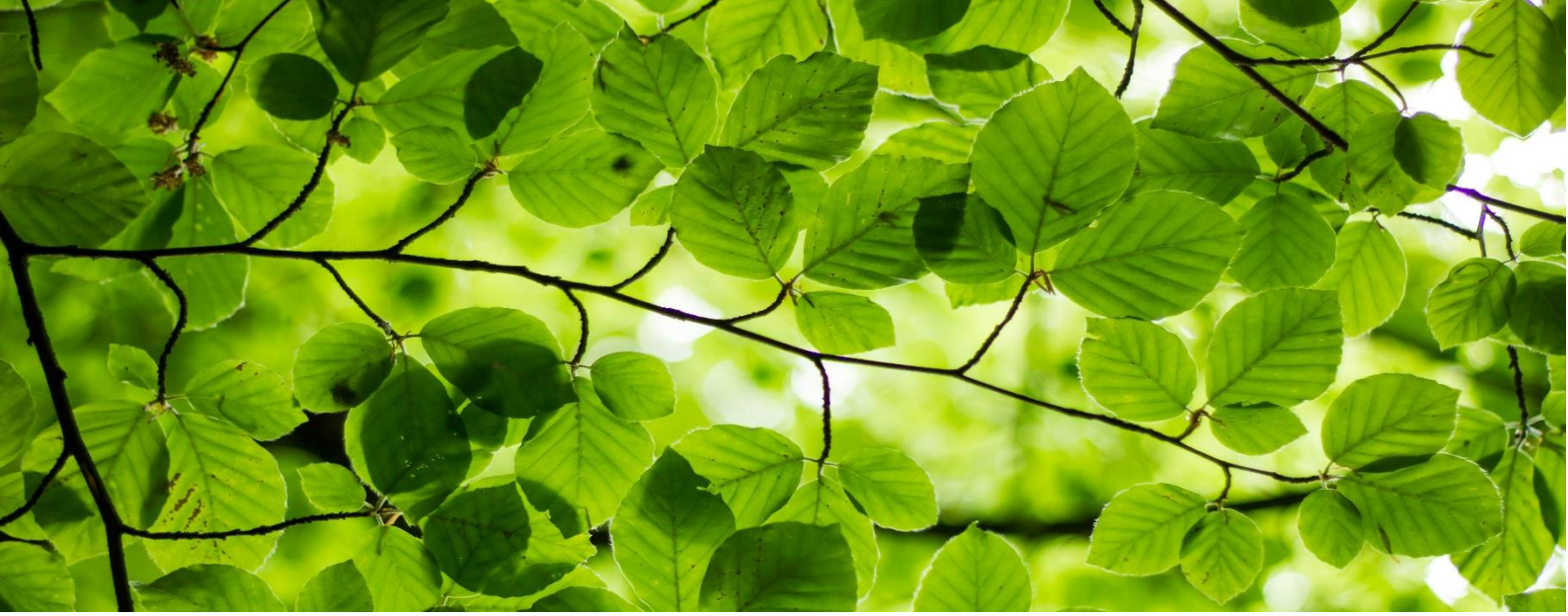
The prototype was trialled at the Glastonbury festival in June 2022 in the Science Tent area. We identified a range of improvements we can make to the model design and accompanying learning resources for next year.

The new Lego NBS model in action at Glastonbury (left) and the AR Sandbox at the Manchester Science Festival (right).

Public engagement

We have supported four high profile Science Festival events with our partners. At each event, our volunteers were able to talk to diverse communities and have many interesting conversations about flood risk, climate change and resilience:

- London Science Museum with the Environment Agency supporting the 'Science on a Sphere' exhibition.
- Manchester Science Festival with the Environment Agency supporting an exhibition focused on climate change and community resilience.
- Glastonbury Festival in the Science Futures tent with Lancaster University and the British Ecological Society supporting an interactive display on nature-based solutions.
- Cheltenham Science Festival supporting UKCEH's activities at the festival.



6 Building our reach and enabling knowledge exchange

Overview of digital engagement

Our website (www.jbatrust.org) enables people to easily access all our publications and educational resources, as well as find information about JBA Trust and our research projects. It continues to help us deliver our charitable objectives of sharing best practice and supporting engagement and education.

In 2021-22 we received 115 direct enquiries about research support, our physical models, bursaries and scholarships and support for educational activities and events.

We use Twitter to publicise research outputs, new resources, publications or scholarships and awards. The number of **@JBATrust** followers is steadily growing and by the end of 2021-22 we had 1,085 followers.

JBA Trust's YouTube channel hosts all our video resources and we now have over 54,000 subscribers. Across social media platforms, our videos have received over 35 million views.

Global reach

This year we responded to over 94 requests from around the world for support and assistance from people who, having seen our physical model and weather station resources, would like to build their own or set up their own educational project. The contacts came through social media or our website contact pages.

By sharing factsheets and detailed specifications for our models, we aim to enable people to create their own educational resources to support their communities and raise awareness of flood risk management. In some cases, we have established an on-going dialogue with people who have approached us to help them with their own projects. We have helped high school and college students, university researchers, teachers and private individuals.

7 Reflection on our first 10 years and future plans

In September 2022, we hosted two events and invited attendees to help us to shape our plans for research, engagement and education. Each event had a different focus:

Research partnerships and future priorities – this was a virtual event where we shared some highlights of our collaborative research and held a workshop session to help prioritise our future research activities.

Science translation, education and engagement – this was an in-person event where partners could explore the learning resources we have developed to support flood risk education and engagement, and see all our physical models in action.

We are using the feedback from the workshops to help us review our research themes and continue to develop our engagement resources. We are already supporting research on some of the topics raised, including on applications of machine learning alongside process models, and on social justice in flood risk management. We also aim to prioritise events with wider reach, like science fairs, and find partnerships to connect with new groups.

Summary of feedback from the workshop events

8 Structure, governance and management

JBA Trust is a company limited by guarantee and is governed by its Memorandum and Articles of Association. It was incorporated on 9 November 2011.

Directors and trustees

The Trustees serving during the year were as follows:

Trustees	Rob Lamb, JBA	(Managing Director of JBA Trust)
	Jeremy Benn, JBA	
	Jim Hall, Oxford University	
	Keith Beven, Lancaster University	
	Nick Russell, Independent financial consultant	
Secretary	Craig Robson	

Governance

The trustees review the activities of JBA Trust every six months to ensure that they are focused on supporting the purpose of the charity. The review also considers the strategic direction of the charity and considers how planned activities will contribute to public benefit.

We have referred to the guidance contained in the Charity Commission's general guidance on public benefit when reviewing our aims and objectives and in planning our future activities.

Appointment of trustees

On incorporation of the JBA Trust, the Board of Trustees was appointed by invitation.

To preserve independence of the JBA Trust from JBA Group companies, which provide part of its core funding, the JBA Trust's Articles of Association stipulate that the number of trustees

connected to or employed by JBA Group shall always be less than half of the total number of trustees appointed at any given time.

The trustees are not remunerated (other than payment to cover travel and accommodation costs where required for JBA Trust business).

Trustee induction and training

Periodically, the trustees meet and are briefed on their legal obligations under charity and company law, updates to the Charity Commission's guidance on public benefit, the content of the Memorandum and Articles of Association and the JBA Trust business plan.

Organisation

The Board of Trustees meets every six months and is responsible for the strategic direction and policy of the charity. A Managing Director is appointed by the trustees to manage the day-to day operations of the charity and is supported by a Programme Manager.

Risk management

The trustees have a risk management strategy which comprises:

- An annual review of the risks the charity may face
- Policies and procedures in place to mitigate those risks
- Plans in place to minimise the impact of the risks should they materialise.

The principal risk to JBA Trust is financial sustainability. This is mitigated by having a robust reserves policy and a clear financial plan which is reviewed and subsequently approved by the trustees at the start of the financial year.

JBA Trust adopts policies and procedures from our host, the JBA Group, which are externally validated where applicable. These include policies on: Health and Safety; Energy Use; Environment; Sustainability; Social Responsibility; Equality and Diversity.

9 Financial review

The principal funding source for JBA Trust is JBA Group dividends. JBA Trust also aims to leverage funding for research projects by supporting partners in applying for funding from external organisations, for example UK Research and Innovation (UKRI) grants awarded to university partners for PhD studentships. We also generate a small amount of additional income from hiring out our physical models for use by commercial organisations. Personal donations are processed through an online giving platform that enables Gift Aid to be claimed efficiently.

Reserves Policy

Reserves are required to minimise the financial risks associated with the unlikely event of unplanned or unforeseen expenditure. The JBA Trust maintains sufficient reserves to cover all contractually committed expenditure or liabilities and operating costs for one year.

Plan for future periods

JBA Trust anticipates continued long-term funding from JBA Group. To ensure that the charity maximises the value of its income in carrying out its activities, the strategic plan focuses on continuing to seek match funding for research projects from funding bodies, including Universities and Research Councils. In the future JBA Trust may also wish to generate an income by licensing datasets, results or models generated by research.

The trustees declare that they have approved the Trustees Report above.

On behalf of the trustees

Rob Lamb, Managing Director of JBA Trust 1 March 2023