JL1/OBJ/9

NETWORK RAIL (CAMBRIDGE SOUTH INFRASTRUCTURE ENHANCEMENT) ORDER

PROOF OF EVIDENCE

JAN LÖWE
DIRECTOR OF MRC LABORATORY OF MOLECULAR BIOLOGY

MEDICAL RESEARCH COUNCIL

1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Professor Dr Jan Löwe (FRS ML).

1.2 I am the Director of the MRC Laboratory of Molecular Biology (LMB), Cambridge with overall responsibility for science delivery supported by our annual £46M budget provided by MRC/UKRI.

1.3 I have been employed at the LMB for over 25 years working initially as a Post-doctoral researcher and then, since 1998 in various leadership roles, including Programme Leader, Joint Head of Division and Deputy Director. I have been Director of the LMB since 2018. My scientific work concentrates on Structural Biology and Microbiology.

2. INTRODUCTION AND SCOPE OF EVIDENCE

2.1 My proof of evidence is given on behalf of the Medical Research Council (OBJ/9) and relates to its Laboratory of Molecular Biology is set out as follows:-

Section 1 – Outlines my qualifications and experience;

Section 2 – Sets out the content of my proof of evidence;

Section 3 – Sets out what the MRC is, its history and what its purposes are;

Section 4 – Introduces the LMB, explains its function and the type of work that is carried out there and the type of equipment used;

Section 5 – Sets out the potential impacts of the Order on the LMB;

Section 6 – Provides an update on negotiations to date and the protections that MRC seeks; and

Section 7 – Contains my summary and conclusions.

3. BACKGROUND AND PURPOSES OF MRC

3.1 The Medical Research Council ("MRC") is one of the nine councils that together form UK Research and Innovation (UKRI), a non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS).

3.2 The foundation of the MRC has its origins in the 1911 National Insurance Act which put in place schemes for health and unemployment insurance. One provision, paid for with a penny per worker per year, was sanatorium treatment for TB and for "purposes of research". This created a national fund for medical research then amounting to £57,000 per year (equivalent to almost £4 million today).

3.3 The Medical Research Committee and Advisory Council was established in 1913 to oversee how this money was spent. The Committee set up its own research programmes and by 1919 had evolved into the Medical Research Council which was granted a Royal Charter, covered a wider field of research and reported to the Minister of Health. Under the Haldane Principle MRC could make its own research and scientific decisions independent of government. The MRC continued to operate under a series of Royal Charters until the creation of UKRI in 2018 when it became a component part of the new organisation (see section 3.5 below).

3.4 The purpose of the MRC is to improve human health through world class medical research. To achieve this we support research across the biomedical spectrum, from fundamental lab-based science to clinical trials and in all major disease areas. We work closely with the NHS and UK Health Departments to fulfil this purpose and give a high priority to research that is likely to make a real difference to clinical practice and the health of the population.

3.5 The UKRI was established in 2018 (under the provisions of the Higher Education and Research Act 2017) by bringing together the nine existing research and innovation funders, including the seven research councils, Innovate UK and the research functions performed by the Higher Education Funding Council for England (HEFCE), whilst preserving the strengths of individual disciplines.

3.6 UKRI was formed as a single executive non-departmental public body operating at arms-length from government. The aim was to retain the world class strengths of the current research councils while developing a more agile and responsive research and innovation funding system (see the Explanatory notes to Part 3 of the Act) (see **Appendix 1**).

3.7 A major proportion of MRC funding is nowadays used in supporting research teams in universities via programme grants and similar financial support to enable universities to carry out additional research to what they would otherwise be able to conduct without our financial input.

3.8 In addition to this MRC also supports a number of directly owned research institutes including the MRC Laboratory of Molecular Biology, and the MRC London Institute of Medical Sciences, and is also a major funder of jointly owned Institutes including the Francis Crick Institute at Euston and the Dementia Research Institute (DRI) at UCL. The DRI is the national investment into dementia research while the other institutes all research into a wide range of human diseases and potential treatments.

3.9 The MRC Strategic Plan is based on four foundations: Discovery Science (investing in the best research to push the frontiers of knowledge); Investing in People (supporting outstanding researchers and building capacity, especially in clinical and quantitative research); New Technologies and Infrastructure (ensuring access to cutting edge technologies and expert support); and Fostering Collaboration (to support new research challenges and share expertise). We give particular emphasis to developing research and partnerships in our health focus themes: prevention and early detection; precision medicine; multi-morbidities; advanced therapies; mental health; antimicrobial resistance and global health.

3.10 Our work ranges from laboratory research, for example on genes and molecules, right through to research with people, such as clinical trials and population studies. Our science is split into six broad areas of research: infections and immunity, molecular and cellular medicine, neurosciences and mental health, population and systems medicine, global health and research that can be translated into immediate applications.

4. THE LMB

4.1 In 1947 the Medical Research Council set up a 'Unit for Research on the Molecular Structure of Biological Systems' to enable Max Perutz and John Kendrew to develop their work using X-ray diffraction to study proteins.

4.2 The unit quickly diversified into other areas, including the structure of DNA, mechanism of muscle contraction, and structure of viruses, and became one of the birthplaces of modern molecular biology.

4.3 This work was done while the unit was housed in the Physics Department at the University of Cambridge's Cavendish Laboratory. The MRC, realising the potential for medical applications of these developments, provided a new building for the unit, and in 1962 the Laboratory of Molecular Biology (LMB) was opened on the east of the Addenbrooke's hospital site.

4.4 The LMB is a research institute dedicated to the understanding of important biological processes at the levels of atoms, molecules, cells and organisms. In carrying out the wide range of experiments at the LMB, we provide knowledge needed to solve key problems in human health such as the elucidation of the DNA double-helix structure, the method for sequencing DNA and the discovery that anti-bodies fight viruses within infected cells.

4.5 The LMB has made revolutionary contributions to science and medicine – often through the development of new techniques. Advances in X-ray crystallography and electron cryo-microscopy (cryo-EM) to determine protein structures are now used for structure-based drug design, DNA sequencing is a cornerstone of molecular medicine and diagnosis, and the development of monoclonal antibodies have led them to become one of the most powerful therapeutic tools.

4.6 The combination of ambitious goals, a shared budget and stable long-term support has generated a unique collaborative LMB culture that values boldness and originality. It has resulted in twelve Nobel Prizes awarded for work carried out by LMB scientists, and has contributed, in part, to eleven Nobel Prizes awarded to alumni for work done elsewhere.

4.7 The LMB pushes the limits of knowledge and feasibility, illuminating biology with the exactness of chemistry and physics: computational approaches are becoming ever more powerful, biophysical methods have revolutionised molecular imaging and new approaches in chemical and synthetic biology and biotechnology provide the tools for future discoveries and applications. We also continue to promote the application of our research findings, both by collaboration with existing companies small and large and by the founding of new ones.

4.8 The LMB provides a diverse and unsurpassed environment for both young and established researchers, with state-of-the-art facilities and a unique scientific culture. Our scientists are drawn from all over the world, creating a lively international community for the exchange of ideas and technical innovation. Many are inspired by the knowledge that discoveries made at the LMB have made a difference to the world and will continue to do so.

4.9 Despite efforts over many years to upgrade the original 1962 LMB building to keep up with ever changing scientific requirements, by 2002 it became clear that the facility was no longer able to meet the needs of 21st century molecular biology.

4.10 Insufficient plant space was available to allow the building to house the equipment required for close environmental control of many specialist facilities. Limited riser space impacted electrical and water system upgrades and the expansion of vibrationally sensitive equipment requiring specialist support was becoming more and more difficult to achieve.

4.11 Design work on the new LMB Building began in 2005 with a focus on an engineering led design capable of supporting the LMB's science for the next 50 years and beyond. The key to this was to ensure a robust mechanical, electrical and structural engineering solution with a focus on future adaptability.

4.12 The current, purpose-built building is to the west of the Addenbrooke's site on what is now known as the Cambridge Biomedical Campus. It was designed by RMJM architects and built by BAM Construction. Preliminary work on the building began in summer 2008 and it was officially opened by the Queen in May 2013.

4.13 Costing £212 million the building provides first class facilities to some of the world's leading scientists. As a key component in the development of the Cambridge Biomedical Campus, the LMB is located at the hub of one of the largest and most internationally competitive concentrations of healthcare-related talent and enterprise in Europe.

4.14 The building provides around 27,000m^2 of world-class workspace, divided between three main floors. In overall structure, the building is reminiscent of a paired chromosome, with two long laboratory areas joined by an atrium housing support facilities.

4.15 With a fundamental focus on minimising vibrational and electromagnetic interference on the LMB's varied imaging and analytical equipment, all heavy-plant servicing the building is housed either in a separate energy centre, or in the four stainless-steel clad towers linked to the building. This approach removes weight, sources of vibration and significant electromagnetic fields from the laboratory itself. Any significant electrical switching and high voltage

equipment that may generate electromagnetic fields is located at the rear of the energy centre, far away from the main laboratories.

4.16 Between the floors are full height Interstitial Service Voids (ISVs), which house the ductwork, pipes and services that serve the labs. These ISVs can be accessed directly for maintenance and modifications without entering the laboratory spaces themselves. This allows changes to be made rapidly and with minimal disruption, giving flexibility to meet the needs of the future and ensuring a long life for the building. In these spaces, all plant is suspended from the floor above via steel drop rods to help with weight and vibration concerns.

4.17 The structural engineering solution for the ground floor of the LMB was specifically enhanced through analysis and redesign to allow the LMB's most sensitive scientific equipment to be located there, increasing the number of structural piles to improve the rigidity of the slab in the mid-column position.

4.18 The building accommodates over 600 people including 450 scientists and 160 support staff. To help encourage the exchange of ideas and technical innovation, 40 scientists from the University of Cambridge Molecular Immunity Unit are also based in the building.

4.19 In its facilities, the LMB operates a range of extremely sensitive and complex equipment, such as its electron microscopy equipment, nuclear magnetic resonance equipment, confocal microscopy, high resolution optical microscopy, imaging facilities, X-ray crystallography equipment as well as supporting behavioural studies on animals and housing specialist zebrafish facilities which fall under Home Office licences for operation. All of this equipment and others within the facility have a range of sensitivities to air and ground borne vibration.

4.20 The LMB's most sensitive equipment are its electron microscopes that have sensitivities that are orders of magnitudes more exacting than other sensitive scientific equipment. This equipment is principally housed in the north east laboratory block on the ground floor. It has been specifically located here to minimise any vibrational noise that may be generated by the existing railway line immediately to the western boundary of the LMB site. However, as electron microscopy requirements expand, there are now lower resolution electron microscopes also housed in the south central laboratory space on the ground floor.

4.21 The LMB's electron microscopes are continually being replaced and upgraded, but currently include three 120 kV transmission-electron microscopes (TEMs), two 200kV FEG (field-emission gun) TEMs, and five 300kV FEG TEMs (three Titan-Krios and two Tecnai Polara) for specimen optimisation and high-resolution single-particle cryoEM and cryo-/STEM tomography data collection. All 300kV TEMs are equipped with direct-electron detectors and energy-filters for high-

quality cryoEM imaging. The LMB also has a Dual-beam FEG scanning EM (FIB-SEM) with cryo-transfer system available for preparation of lamella for cryo-tomography.

4.22 Of the above, it is the Polara and Titan Krios that are the most vibrationally sensitive with the Polara having updated detector heads that improve their imaging capabilities. For this equipment, manufacturers specify that sites must have floor vibrations limited to vibration criterion levels (VC) VC-F and VC-G for installations, though it is accepted that this exacting requirement can be reduced based on results from the manufacturer's own site surveys that are required prior to purchase and installation.

4.23 The LMB is looking to expand the number of these units over the coming years and it is imperative that the vibrational performance of the building is not adversely affected from its current levels by the construction or operational changes arising from the proposed Network Rail development.

5. IMPACTS OF ORDER ON LMB

5.1 Whilst the land take appears to include a relatively small area on the Order plan, the potential impacts on the operational requirements of the LMB are considerable due to the highly sensitive nature of the work that is undertaken at the laboratory as explained above.

5.2 Whilst the points in the statement of case need to be taken into account, the following impacts are of particular cause for concern:

Vibration from the Construction Works

5.3 The LMB has been specifically designed to ensure that the performance of the building and its ground floor slab can accommodate highly vibrationally sensitive equipment (for example, electron microscopes) and/or experiments can be undertaken almost anywhere within the footprint of the building.

5.4 External source vibrations such as those arising from heavy road traffic, construction works (piling etc) or train passing events has the potential to create problems at the LMB. Such events can detrimentally affect the performance and reliability of sensitive scientific equipment including high resolution confocal and electron microscopes and can critically impact the efficacy of the experiments meaning they would need to be run again or put on hold for the period when the vibrations are being experienced.

5.5 Typical experiments are conducted over a period of 18 hours with some lasting up to 72 hours. With high demand for the microscopes outstretching availability, failed experiments could take many weeks to re-run if disturbed which would come at a great cost both financially and with regards to the importance and urgency of the work being undertaken.

5.6 In order to ensure that the LMB building is not adversely affected through the construction works or from the ongoing operation of the new rail line and station, the MRC require the following:

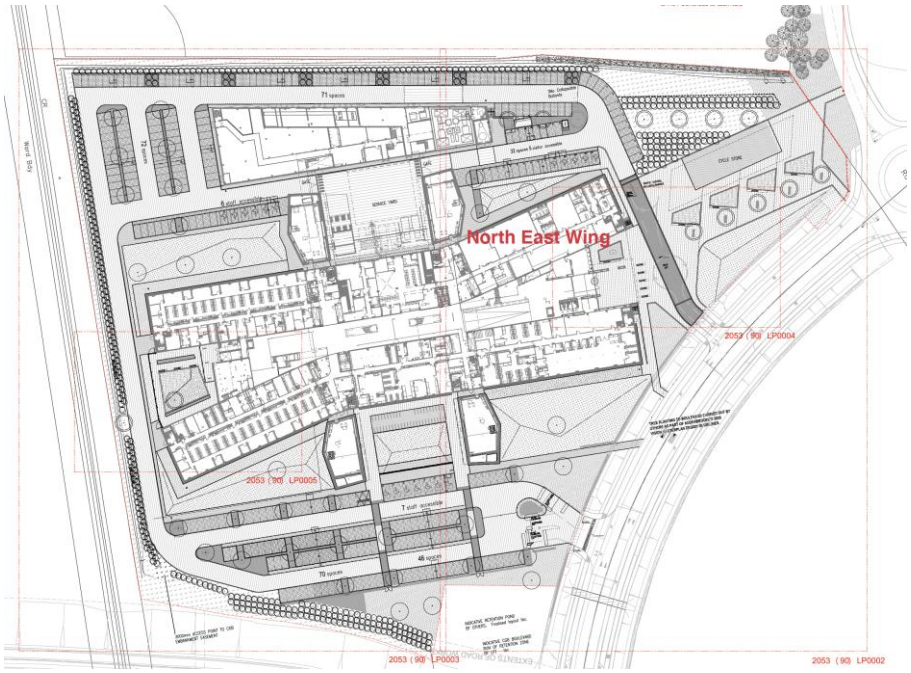
5.6.1 Network Rail undertake to produce a detailed method statement for the construction of the works authorised by the Order which are directly adjacent to the Laboratory of Molecular Biology (LMB) site and the associated movement of large metal parts, plant, and machinery during the construction process. The detailed method statement must include details of the proposed noise and vibration mitigation measures to be implemented during construction to ensure the safe and efficient continuation of the operations and processes at the LMB.

5.6.2 The method statement will need to include, but not be limited to, specific noise and vibration limits and proposals for real time monitoring along with protocols to avoid any breaches of the agreed limits.

5.6.3 Network Rail to specify the geometry and location of the proposed new points to the west of the LMB site, in line with Ramboll's assessment.

5.6.4 Network Rail to use reasonable endeavours that residual vibration from trains would be within the agreed limits i.e. VC-D in the north east laboratory wing at ground level (see plan at Figure 1 below), and VC-B elsewhere at ground level and provision for potential further mitigation if these limits are not achieved.

Figure 1



5.6.5 Network Rail to commit to amber and red trigger levels for construction vibration in the north east wing at ground level to be VC-D – 30% for amber and VC-D with no tolerance for red.

5.6.6 Network Rail to commit to amber and red trigger levels in the South West wing to be VC-B-30% for amber and VC-B with no tolerance for red.

5.6.7 The construction vibration monitoring must be continuous for the duration of the works and be located in the equivalent locations to the baseline survey in the ES. Protocols for dealing with alerts to be agreed and appended to the agreement.

5.6.8 With regards to operational vibration, a post completion survey is required to demonstrate that operational vibration is kept within VC-D in the north east wing at ground level and VC-B elsewhere on the ground floor of the building. A second post completion survey shall be conducted after 6-12 months to demonstrate that vibration levels have not increased over time due to wear in the track or points deterioration.

5.6.9 If agreed limits are exceeded then parties will enter into discussions as to how to reduce the impacts as quickly as possible and NR should use reasonable endeavours to meet the agreed limit.

Noise

5.7 The LMB is home to a number of laboratory animal species which are used in some of the experiments carried out on Site. In particular, rodent species are highly sensitive to noise (as well as vibration and dust). Excess noise has an impact on the breeding regimes of the mice, such regimes being key to the experiments that are undertaken.

5.8 There will additionally be noise impacts from the construction works on staff recreational areas external to the LMB building, and while these adverse effects will be real, they do not form the basis of the objection. Construction noise must be carefully controlled to avoid impact on LMB operations.

5.9 In order to ensure that the LMB building is not adversely affected through the construction works, the MRC require Network Rail to commit to monitoring construction noise by using an external noise monitor (approved by MRC) in front of the west facade of the LMB with thresholds set at amber $L_{Aeq15\ min}$ 75 dB and red L_{Aeq1hr} 75 dB and a daily limit of $L_{Aeq10hr}$ 70dB. (This allows short periods 15 mins of noisy activities but the daily level effectively limits the duration of the noisy periods). Network Rail should use reasonable endeavours to avoid generating noise conditions above these thresholds.

Drainage

5.10 Part of the land to be acquired by Network Rail is a ditch area that is part of the drainage plan for the site and designed to cope with a 1 in 100 year flood event with a 20% allowance for climate change. Efforts must be put in place to avoid any impact on the site's drainage strategy.

5.11 In order to ensure that the LMB building is not adversely affected through the construction works, the MRC require Network Rail to provide MRC with details of any temporary accommodation works which are proposed which may impact the drainage systems and undertake that MRC will be in no worse position in respect

of drainage flows equating to 2 Litres, per second per hectare based on the original land holding area.

5.12 In addition, Network Rail will commit to carry out any temporary accommodation works in the same manner as the permanent works with regards to mitigating the impacts of (inter alia) noise, vibration, and the generation of dust and dirt.

5.13 The MRC require Network Rail to carry out a pre-commencement closed circuit televisual survey of the foul and surfaces water drainage network where construction access will pass over in the works phase to identify any defects prior to the works commencing and carry out a photographic record (condition survey) of the car park access road prior to commencement of the works.

5.14 Network Rail must agree to make good any damage to the drainage network that is caused by the carrying out of the works.

5.15 With respect to the Operational Phase of the new scheme, the MRC require Network Rail to provide the final CSIE scheme drainage design, drawings and calculations prior to submission to GCSP and confirm that MRC will be in no worse position in respect of drainage flows equating to 2 Litres, per second per hectare based on the original land holding area.

5.16 The MRC also require Network Rail to commit to reinstating the swale at their own cost following the completion of any permanent or temporary construction works.

6. CONSULTATION AND NEGOTIATIONS WITH NETWORK RAIL

6.1 The LMB was first contacted by Network Rail (NR) via email on the 1st April 2020 where they highlighted that they had started promoting the Cambridge South Station Project and asked if there were any vibration sensitivities within the laboratory that they should be aware of so they could work with us to provide suitable mitigation activities as required.

6.2 On the 7th April 2020, the LMB set-out the performance requirements of its building, specifically across the ground floor where the most sensitive equipment is located and suggested that specialist expertise was brought in to assess any potential impact on our most sensitive equipment.

6.3 Having been provided with outline plans for three station options that NR were exploring on the 27th May, further correspondence followed with the LMB sending details to NR of the most sensitive electron microscopy equipment in the facility and details of their location.

6.4 The LMB then followed up this correspondence to NR, noting that the LMB was aware that NR had now selected their station location closest to the LMB and asked for reassurance that its construction and operation would not have any impact on LMB operations. This request for reassurance was not provided at this time.

6.5 On the 1st July 2020 NR sent an email to the LMB setting out that further questions about the LMB had been raised by their design team and asked for details about other potential impacts including those arising from construction. NR also raised the possibility of using the LMB car park for accessing the boundary of the railway.

6.6 A meeting was held on the 14th July 2020 with Network Rail and a representative from their design team (Arcadis). At this meeting, a high-level description of the proposals was provided by NR to the LMB. The LMB raised a number of points including that specialist vibration consultancy should be employed by NR to determine the potential vibrational impact on the LMB's electron microscopes, that construction impacts would need to be carefully investigated to ensure noise, electromagnetic interference, dust and other construction elements would be managed to limit impact and that access to the railway boundary or track through the LMB could be agreed subject to understanding the details. The LMB also highlighted that the drainage of the site (specifically a swale on the western boundary) would need to be carefully considered if trying to access the railway from this direction. The LMB further highlighted that NR might wish to consider accessing the railway boundary via an existing access route at the toe of the embankment of the Cambridge Guided Busway to the south of the site.

6.7 Following this meeting, NR provided details on the 27th July 2020 of the types of access requested via the MRC car park for a period of around 8 months during construction. This access would include dumpers, rollers and excavators with around 20 vehicles per day accessing the site.

6.8 The LMB discussed the request internally and on the 7th August told NR that this access was not considered to be appropriate due to H&S concerns with that volume of construction traffic being routed through a staff car-parking area with extensive pedestrian routes. However, through additional correspondence and necessary reassurances, the LMB stated that occasional maintenance access would be acceptable based on the description of the type of access provided.

6.9 On the 8th September 2020 NR asked for the LMB to provide them with details of cycle parking numbers on the LMB site and any details of staff transport movements. The LMB responded with these details on the 8th and 9th September 2020 and also provided a contact to receive details about the campus wide annual travel survey.

6.10 On the 5th October 2020, NR contacted the LMB to request details of any equipment that may be subject to electromagnetic interference. On the 13th October 2020, the LMB stated that based upon the proposed changes to the railway lines that had been previously described there were no concerns.

6.11 On the 2nd February 2021, designers working for NR contacted the LMB to discuss undertaking vibration measurements of the site to determine whether mitigation activities would be required.

6.12 The survey was undertaken on the 8th February 2021 and a meeting was held on the 23rd March to discuss the initial findings from the vibration survey. On the 31st March 2021, the LMB wrote to NR and highlighted that the LMB had concerns about the findings of the survey and set-out that further investigations would be required to understand the potential impact, appropriate mitigations that could be applied and any technical solutions that could be considered, whether at the equipment or at the railway.

6.13 On the 30th April, in email correspondence NR stated that they recognised the LMB's concerns and that ongoing engagement would be required through the design stage. An engagement plan was provided, but it was made clear that no further actions on vibration were proposed ahead of the Transport and Works Act (TWAO) submission.

6.14 On the 17th June 2021, the MRC received a letter concerning the compulsory purchase of land on the LMB site in relation to the South Cambridge Station proposal. The deposited plans also set out how temporary acquisition of parts of the site would also be sought under the TWAO.

6.15 As the temporary and permanent purchases of the LMB site had not been previously raised with the LMB or MRC as part of any discussion, the MRC issued a formal objection to the Secretary of State on the 30th July 2021. The grounds for this objection were multi-fold including the impact of vibration from construction works with the LMB site's boundary from the railway being significantly reduced through the proposed acquisitions. The letter of objection also raised concerns about *inter alia* noise, dust and drainage which had been highlighted as concerns over a year previously with no substantive progression by NR looking to resolve these potential issues.

6.16 Following the notification of the compulsory purchase under the TWAO, Network Rail increased their engagement with the MRC and following a presentation of the scheme to the MRC on the 29th June 2021, an on-site meeting was held at the LMB on the 5th August with Network Rail representatives.

6.17 Detailed discussions were held with Network Rail (NR) on the 24th September with the MRC's objections including with respect to noise and vibration being explained again to NR.

6.18 NR issued technical reports from their consultant advisors on noise and vibration to the MRC on the 14th October 2021.

6.19 From the 21st October onwards, the MRC and NR have had a weekly meeting to try and close out the concerns arising from the MRC's objections. Most of the issues that the MRC set-out in its objection letter of the 30th July 2021 are close to being resolved (in part due to reduced permanent and temporary land acquisitions being requested in a revised TWAO submission). Heads of Terms setting out how the MRC's concerns will be mitigated, has been agreed and on 6th January 2022 NR issued the first draft of the agreement.

7. SUMMARY AND CONCLUSIONS

7.1 The MRC plays a fundamental role in ensuring that human health continues to improve by carrying out highly specialist and highly technical experiments and clinical research at sites such as the LMB.

7.2 As such, it is critical to the ongoing success of the MRC that its laboratories and research centres are allowed to operate without the interference of third party operations.

7.3 It is clear that the scheme (both during construction and when the upgraded route is in operation) could have some severe adverse impacts on the LMB, most notably in relation to noise, vibration, and drainage, and it is therefore of paramount importance that Network Rail seek to mitigate any impacts to the fullest extent possible so as not to jeopardise and put at risk the extremely important work that is being undertaken at the LMB.

I confirm that the facts stated within my evidence are true.

Dr Jan Löwe
Director of the Medical Research Council's Laboratory of Molecular Biology
Date: 7 January 2022

Appendix 1

Explanatory Notes to Part 3 of the Higher Education and Research Act 2017

Part 3: Research

29. This Act streamlines the current research and innovation landscape by bringing together the nine existing research and innovation funders, including the seven research councils, Innovate UK and the research and knowledge exchange functions currently performed by HEFCE, whilst preserving the strengths of individual disciplines and providing legislative protection for dual support funding of research.
30. In December 2014 the Government published "Our Plan for Growth: Science and Innovation", a joint HM Treasury and Department for Business, Innovation and Skills strategy to support United Kingdom research and innovation. Linked to the strategy was a commission to Sir Paul Nurse, then the President of the Royal Society, to undertake a review with the research councils to: "look at how [the] councils can evolve to support research in the most effective ways by drawing on a range of evidence, including international comparisons and the views of the scientific and business communities".
31. The 2015 Conservative Manifesto pledged to make use of Sir Paul's findings which were published in November 2015. At the 2015 Spending Review Government reiterated its manifesto commitment to support the Nurse recommendations and indicated it would consider the inclusion of Innovate UK. A consultation on this was launched in February 2016.
32. These initiatives, complemented by the November 2015 Green Paper consultation form the basis of Part 3 of this Act, which is based on the following key principles:
    a. the aim of strengthening strategic thinking on cross cutting priorities and developing a more agile and responsive research and innovation funding system;
    b. the aim of retaining the world class strengths of the current system, including the Haldane principle, the dual support system and Innovate UK's distinct business facing focus;
    c. the importance of subsidiarity, with decisions needing to be taken at the lowest effective level and leaders in particular fields of activity given full responsibility for decisions in their areas; and
    d. the aim of reducing bureaucracy, freeing up research and innovation leaders to focus on strategic decision-making.
33. This Act provides for the formation of a single executive non-departmental public body operating at arm's length from Government. As outlined in the Government's White Paper "Success as a Knowledge Economy: Teaching Excellence, Social Mobility & Student Choice", published on 16 May 2016, this new body, UKRI, brings

together the seven research councils and integrate Innovate UK, while retaining Innovate UK's distinctive business focus and separate funding stream. In addition, it integrates the research and knowledge exchange functions currently performed by HEFCE, maintaining its hypothecated funding streams and protections for the dual support system - in England.

34. This Act provides for nine "Councils" within UKRI – seven of which will represent the Research Councils - which will have autonomy on scientific, innovation and research decision making, with delegated budgets. This Act provides for UKRI to delegate functions to the Councils, with each Council responsible for the strategic leadership and research and scientific decisions in their area. Councils are led by Executive Chairs, appointed by Ministers on the advice of UKRI's board and reporting to UKRI's CEO. The Executive Chairs will each have significant expertise in their particular fields of activity (e.g. medical research, innovation). The Executive Chair will discharge the implementation of their Council's decisions on a day-to-day basis. UKRI's board will have responsibility for leading overall strategic direction and cross-cutting decision making, including managing funds with cross-disciplinary impact.