Witness Name: Dr Joanne McClean
Statement No: 1
Exhibits: PHA-7/01 - PHA-7/24
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UK COVID-19 INQUIRY

WITNESS STATEMENT OF JOANNE MCCLEAN

I, Dr Joanne McClean of the Public Health Agency for Northern Ireland will say as follows:

1. This statement is made on behalf of the Public Health Agency (PHA) in response to a request for evidence by the Inquiry pursuant to Rule 9 of the Inquiry Rules 2006. There are 24 Exhibits produced with my statement. This is my first statement in relation to Module 7 of the Covid-19 Inquiry.

2. I was appointed as Director of Public Health (DPH) for the PHA in July 2022 and took up post on 1 September 2022. I hold a primary medical degree (MBBCh BAO) awarded by Queen's University Belfast (QUB) in July 1999. I also hold a Master's degree in Public Health awarded by the University of Manchester. I am a member of the Faculty of Public Health of the Royal College of Physicians and secured membership by passing the membership examinations. I am a registered doctor with a license to practice and am on the General Medical Council (GMC) specialist register for public health medicine.

3. After graduation I worked in junior doctor training posts in clinical medicine. I joined the Northern Ireland (NI) higher specialist training scheme for public health medicine in August 2004. I completed training and was appointed to a consultant post in the Service Development and Screening Division of the

PHA in January 2011. Between my appointment and January 2020, the focus of my work was on providing public health input to the commissioning of health services for children. I continued to maintain knowledge and skills relating to health protection and provided support to the health protection service when required, including providing consultant cover for the health protection on call service when the service faced staffing challenges during this period.

4. At the onset of the Covid-19 pandemic, my main focus was on ensuring paediatric services were ready for the expected wave of infection. Since it was evident early on that children were not as severely affected as adults, my focus was on ensuring paediatric services were configured to ensure continued provision of acute and inpatient care in the face of high levels of staff sickness and a huge increase in demand for adult care.

5. In April 2020, I was asked to provide input to the management of Covid-19 in the care home sector. This included working with colleagues to develop a plan to support the sector. From late August 2020, I took on lead PHA responsibility for supporting schools and the education sector. I continued in this role until June 2021 when I was seconded to the Department of Health as an Associate Deputy Chief Medical Officer, a role I remained in until taking up the DPH post within the PHA. Given that I did not take on the role of DPH until September 2022, I am not able to provide a first-hand account for some aspects of this statement. I have spoken to and received information from my predecessors and other colleagues, some retired, to gather the required information.

Introduction

6. The system of healthcare in NI does not mirror that in place across the other regions of the UK. Whilst the universal system of healthcare, free at the point of use, was established in 1948, the "NHS" as an entity does not exist in NI. In 1973, health and social services were integrated by the Health and Personal Social Services Order (Northern Ireland) 1972 which created four Health and Personal Social Service Boards (HPSSBs) for commissioning health and

social care from local Trusts. The colloquial term used at that time to describe the service was "the HPSS" although it never existed as a tangible entity.

7. In 2009, the four HPSS Boards were replaced by a single Health and Social Care Board (HSCB) under the provisions of the Health & Social Care (Reform) Act (Northern Ireland) 2009. The HSCB was the body responsible for commissioning services from HSC Trusts (see below for an explanation of the relationship with PHA in this regard) and managing the performance of HSC Trusts against various targets and performance indicators. In April 2022, following an earlier series of reviews of the HSC in NI, the HSCB was dissolved and replaced with a new body called the Strategic Performance and Planning Group (SPPG) which is part of the Department of Health.

8. Given the relevant period as defined in this module, I will mostly refer to HSCB. I will refer to the Department of Health as "DoH" or "the Department". From 2009 and until the present day, the term "HSC" is used to describe the collective system of health and social care in NI. However, as with the HPSS, the HSC is not a body in its own right. I will use the term "HSC" to describe the system of health and social care throughout this statement.

Overview of the PHA

9. The PHA was established as the Regional Agency for Public Health & Social Well-being under Section 12(1) of the Health & Social Care (Reform) Act (Northern Ireland) 2009. The public health functions from the legacy Boards and the Health Promotion Agency were incorporated into the Agency. The PHA is a statutory body and our functions can be summarised under three broad headings:

    - Improvement in health and social well-being – with the aim of influencing wider service commissioning, securing the provision of specific programmes and supporting research and development initiatives designed to secure the improvement of the health and social well-being and reduce health inequalities in the population of NI;

- Health protection – with the aim of protecting the community (or any part of the community) against communicable disease and other dangers to health and social well-being, including dangers arising from environmental hazards and the public health response to major incidents and other emergencies;

- Service development – working with the SPPG with the aim of providing professional input to the commissioning of health and social care services that meet established safety and quality standards and support innovation. Working with SPPG, the PHA has an important role to play in providing professional leadership to the HSC.

10. The PHA is also responsible for research and development across the HSC. To do this we fund a wide range of research programmes and also support capacity to undertake research across the health service by funding research infrastructure in HSC organisations.

11. The Health & Social Care (Reform) Act (Northern Ireland) 2009 is the legislation under which the PHA was founded and Schedule 2 of the Act sets out requirements for the Agency's officers, remuneration, committees, accounts and annual report. Additionally, there are a number of other pieces of primary and secondary legislation under which PHA operates. The key legislation includes:

    - The Public Health Act (Northern Ireland) 1967 sets out the statutory requirements on medical practitioners in NI to inform the Director of Public Health about notifiable diseases (Covid-19 was declared a notifiable disease on the 5th March 2020). To note, that work was underway in and around 2016 to update and reform the Public Health Act. In 2016, the DoH published a review of the Act following a public consultation and in 2024 undertook a further consultation on the policy to underpin a new Public Health Bill.

- The Health and Personal Social Services Order (Northern Ireland) 1972 which sets out requirements, roles and functions of various bodies in the health and social care system in NI.

- The Health and Personal Social Services (Quality, Improvement and Regulation) (Northern Ireland) Order 2003 which places a statutory duty of quality on HSC bodies in the delivery of their services and allows the regional regulator (the Regulation and Quality Improvement Authority or RQIA) to review and inspect these services in order to evaluate the quality of them.

- The Health and Social Care Act (Northern Ireland) 2022 which dissolved the HSCB and in a very small number of cases, amends references in other legislation from HSCB to the PHA.

12. Prior to the pandemic, the Agency was structured under four directorates:
    - Public Health;
    - Nursing, Midwifery and Allied Health professionals;
    - Operations; and
    - HSC Quality Improvement.

    An organizational organogram reflecting the Agency's structure at that time is included (Exhibit PHA-7/01 [INQ000520256]).

13. As part of the pandemic response, the Agency established a new Directorate of Contact Tracing in December 2020, which I will cover later in this statement. With the closure of the Contact Tracing Service (CTS) in June 2022, the Agency reverted to its pre-existing structure which remained in place until 2024 when a number of structural changes were enacted as part of the Agency's Reshape and Refresh reform programme (Exhibit PHA-7/02 [INQ000474951]).

Internal Structures

Public Health Directorate

14. As DPH, I lead the Public Health Directorate with overall responsibility for all its functions. The role is multifaceted but can be divided into two main areas: the first is overseeing the professional public health function and the second is operational management of the Directorate.

15. The DPH role has professional responsibility and accountability for the delivery of the public health function. This means ensuring directorate staff have the required skills and competencies needed to undertake the function. As mentioned, the role is specifically mentioned in the Public Health Act (1967) in connection with the control of communicable disease. The DPH role is also responsible for the delivery of other aspects of the public health function: specifically, health improvement, service development, screening and service development. The role requires the post holder to have completed specialist training in public health and be on the GMC specialist register for public health medicine. I am assisted, by three Deputy Directors of Public Health (DDPH), all of whom being on the GMC specialist register. The DDPHs support me to discharge the public health function and are responsible for leading health protection and other incidents as required.

16. As DPH, I am the operational manager of the Directorate. This remit extends into all aspects of day-to-day management and includes finance, procurement, staff management and contributing to the overall PHA corporate function.

17. In addition to the DDPHs, I have one Assistant Director of Public Health who is responsible for the HSC Research and Development function which is in the Directorate. This individual's experience, skills and knowledge are related to research and development and in general, they would not be expected to lead public health work including, for example a response to a health protection incident.

18. The following tables below show the number and whole time equivalent of staff working in the Public Health Directorate, in total and broken down by division, at key points during the scope of this Module. These figures have been drawn from the PHA workforce information system and include only those members of staff employed on a substantive basis, they do not take into account any locum or agency staff usage at each time juncture.

Public Health Directorate - Headcount by Role

	31-Dec-19	31-Mar-20	31-Mar-21	31-Mar-22
Total Headcount Public Health Directorate	195	193	215	216
AFC Headcount Public Health Directorate	162	161	178	178
Medical/Dental Headcount Public Health Directorate	33	32	37	38

Public Health Directorate - Whole Time Equivalent (WTE) by Role

	31-Dec-19	31-Mar-20	31-Mar-21	31-Mar-22
Total WTE Public Health Directorate	181.69	181.04	199.6	203.58
AFC WTE Public Health Directorate	152.94	151.54	166.65	169.33
Medical/Dental WTE Public Health Directorate	28.75	29.5	32.95	34.25

Public Health Directorate - Divisional Headcount

	31-Dec-19	31-Mar-20	31-Mar-21	31-Mar-22
Total Headcount Director of Public Health Office*	18	18	21	16
Total Headcount Health Improvement	63	61	61	61
Total Headcount Health Protection	42	42	64	67

Total Headcount Research and Development	20	20	20	18
Total Headcount Service Development and Screening	52	52	49	54

Public Health Directorate - Divisional WTE

	31-Dec-19	31-Mar-20	31-Mar-21	31-Mar-22
Total WTE Director of Public Health Office*	15.92	16.52	19.52	14.99
Total WTE Health Improvement	60.26	58.11	57.68	58.99
Total WTE Health Protection	39.24	40.04	60.44	64.04
Total WTE Research and Development	19.33	19.33	18.9	16.9
Total WTE Service Development and Screening	46.94	47.04	43.06	48.66

**The DPH and a number of AFC band 3 and 4 administrative staff who provide support to the wider Directorate sit within this area.*

Test, Trace & Isolate (TTI) in NI

19. Regarding the responsibilities of the PHA in relation to TTI, the Agency:

- Operationalised the pillar two testing strategy including determining and publicising the location of mobile testing units;
- Supported establishments which had outbreaks by providing advice and guidance and delivering interventions such as targeted testing;
- Co-ordinated interventions in workplaces or geographical areas where cases were significantly higher than expected;
- Operated the CTS, including establishing and supporting the NI Covid-19 Care telephony service operated by NI Direct;
- Put in place a system that could take information gathered through testing and contact tracing that identified settings and areas of high prevalence;
- Developed communications and engagement, including media appearances, campaigns and public information.

Decision Making Structures for TTI

20. In response to what was emerging as a significant threat, the Agency stood up an Emergency Operations Centre (EOC) on the 23 January 2020. The purpose of the EOC at that stage was to manage the large amount of information coming to the PHA from its daily teleconferences with the Devolved Authorities Health Protection Services and other sources such as the World Health Organization (WHO) to ensure information was shared with the right people and groups for action. HSC Silver was also established in January 2020, as part of the wider regional command structure, to support the co-ordination of a consistent approach for NI planning and response with reference to the following:

- Identification of potential WN-CoV cases;
- Case management;
- Laboratory testing;
- Patient pathways;
- Co-ordination of communications and sharing of information across the HSC and partner organisations;
- Infection Prevention and Control (IPC) and Personal Protective Equipment.

21. In the early stages of the pandemic a number of cell management groups were created as set out below:

- Executive
- Logistics and Supply
- Infection Prevention Control
- Communications and Media
- Knowledge Management
- Technical Scientific
- Resource (HR and Finance)
- Surge - Integrated Care
- Surge - Acute
- Social and Community
- Business Continuity
- Covid-19 Business General

22. Each cell management group had a name, key email contact, senior staff representation from the PHA, BSO and/or HSCB and a terms of reference. The role of each cell was to review a given query and provide professional direction to the EOC. If the issue could not be resolved then the EOC raised the issue with HSC Silver.

Decision Makers for TTI

23. The table below sets out the key decision makers, their time in post and an overview of their responsibilities during the period to which this module relates.

Role	Name	Period in Post	Responsibilities
Chief Executive	Valerie Watts (interim)	10/2016 – 03/2020	As Accounting Officer, was responsible for overseeing and leading the organisation's overall response to the pandemic ensuring the Agency effectively discharged its statutory responsibilities
	Olive Macleod (interim)	03/2020 – 07/2021	
	Aidan Dawson	07/2021 - present	
Director of Public Health	Dr Adrian Mairs (interim)	03/2018 – 02/2020	As the most senior Public Health professional, was responsible for ensuring that the Agency discharged its statutory public health functions in providing professional leadership and advice to the Chief Executive, Chair, Board, wider PHA and more broadly across the health & social care system.
	Professor Hugo Van Woerden	02/2020 – 12/2020	
	Dr Stephen Bergin (interim)	12/2020 – 08/2022	
	Dr Joanne McClean	08/2022 - present	
Deputy Director of Public Health	Dr Brid Farrell	09/2021 – 04/2023	During the course of the Pandemic a Deputy Director of Public Health post was established to support the DPH in the discharge of their duties.
Assistant Director of Public Health –	Dr Gerard Waldron	01/2019 – 01/2022	Led the response of the Health Protection Service to the pandemic; ensured that the capacity of the service was sufficient to respond
	Dr Gillian Armstrong	12/2021 – 06/2022	

Health Protection	Dr Jillian Johnston	01/2022 – 10/2022	both to the developing and enduring pandemic and the "normal" HP issues; led the communication response within HP; liaised at a high level within and outside HSC to ensure the key issues, advice and guidance were disseminated; established networks with colleagues in other UK nations and the Republic of Ireland.
Assistant Director of Public Health - Service Development	Dr Brid Farrell up until September 2021 when she assumed Deputy DPH role.		As chair of the DoH Expert Advisory Group on testing played a key role in leading on the roll out of the Covid-19 testing system in NI whilst also overseeing the PHA input into critical care surge planning at service level in partnership with HSCB colleagues.
Director of Operations	Ed McClean	04/2009 – 12/2020	Led the Agency's Operations Directorate response to the pandemic, ensuring operation of critical business and governance functions and overseeing business continuity arrangements throughout.
	Stephen Wilson (interim)	12/2020 - 2024	
Assistant Director of Operations – Communications and Knowledge Management	Stephen Wilson	04/2009 - present	Responsible for leading the Agency's public health communications and Health Intelligence programmes throughout the pandemic. Worked in close partnership with counterparts from NI Departmental and Arm's Length Bodies.
Assistant Director of Operations – Planning and	Rosemary Taylor	04/2009 – 05/2021	Led the Agency's financial planning, operational planning and key corporate support services including for example logistical support for

Business Services	Stephen Murray	06/2021 – present	contact tracing premises and equipment.
Director of Nursing & Allied Health Professionals	Rodney Morton	01/2020 – 09/2022	Led on the PHA IPC response, care homes response and support for the vaccination roll out programs. In addition, professional support and advice was provided as required to early years and homeless settings, critical care and respiratory hubs and critical care surge planning.
Director of Contact Tracing	Dr Liz Mitchell	12/2020 – 06/2022	Appointed by the DoH to ensure that the CTS operated in line with strategic direction.
Deputy Director of Contact Tracing	Jennifer Lamont	02/2021 – 02/2023	Oversaw operation of the CTS.

Co-Working

24. Although the PHA had no direct working with the NI Executive during the pandemic, the Agency did work with a range of organisations in relation to TTI. The majority of work took place with the following bodies:

- Public Health England (later UKHSA) - Public Health England (PHE) was the UK focal point designated under the International Health Regulations as the primary recipient for information about public health threats. PHE established an Incident Management Team (IMT) for Covid-19 in January 2020. Each of the devolved nations were invited to participate in the IMT and the PHA attended each meeting held throughout the period. PHE chaired daily teleconferences with the Devolved Authorities Health Protection Services from January 2020, briefing them on the outbreak in China and providing a daily risk assessment.

- Public Health Wales; Test, Trace, Protect Wales; Public Health Scotland and Test and Protect Scotland would have each been part of various four nations groups that the PHA would have sat on throughout the pandemic.

- NHS Test and Trace - the PHA was a member of the UK Government Devolved Administrations Steering Group which was established to support the UK Government Devolved Administrations Board. The group's purpose was to discuss operational issues, impact of TTI policies and to flag/manage associated risks.

- DoH (NI) - As an arm's-length body of the DoH, the PHA worked closely with the Department throughout the pandemic in relation to TTI. The Agency participated in a number of working groups and had frequent formal and informal interactions with DoH staff. The PHA interacted with DoH colleagues at various grades. Senior staff would have included the Permanent Secretary, the Chief Professional Officers and their deputies (mainly Medical, Nursing and Social Work), the Chief Scientific Advisor, and various directors of policy and staff. On occasion the then Minister or his Special Advisor would have approached PHA senior staff directly.

- Health and Safety Executive Northern Ireland (HSENI) - the PHA worked with HSENI throughout the pandemic in relation to public health guidance adherence. Examples of requests from HSENI answered by the PHA included advice on guidance for employers on self-isolation, vaccinated workers, testing of close contacts of positive cases, partitions in the workplace and car-sharing.

- Local Government - PHA staff engaged directly with elected representatives whilst establishing the CTS and answered questions and provided information relating to questions raised by constituents. Throughout the pandemic, the PHA provided briefings to political parties and the NI Health Committee as requested. Staff responded to numerous Freedom of Information requests raised by the public as well as correspondence sent directly and via political representatives. The PHA

already had mechanisms for working with both local government and wider HSC Trusts in planning for and managing public health issues and used these existing networks during the pandemic.

- The Northern Ireland Council for Voluntary Action (NICVA) was represented on the Contact Tracing Steering Group (CTSG) as a means to discuss and address opportunities for community and voluntary support for that part of the Test Trace Protect (TTP) strategy.

- The NI Patient and Client Council (PCC) was also part of the membership of the CTSG and offered support in engaging with patients in respect of contact tracing.

- In respect of the education sector, the PHA worked directly with colleagues in the Department for Education and the Education Authority NI (EANI) providing guidance and advice on managing cases (for example, reviewing their guidance for resuming activities in schools such as music and sport). The PHA also worked closely with the sector to establish a mechanism for contact tracing school children. This included engaging with Trade Union leaders and school leaders to answer questions and address concerns. As part of the work of the CTS, a group was also established that included senior leaders of the universities and further education colleges in NI with the objective of safely returning to face to face attendance. This group put in place arrangements for contact tracing students, isolation guidance and advice on vaccination and safe practice on campus.

- The PHA had very little engagement directly with the NI Executive as a body, instead working with the DoH in line with established protocol. The PHA did on occasion host visits from the First and Deputy First Minister to the regional CTS.

- I am not aware of any direct engagement with the justice sector in respect of TTI but I know that colleagues did provide general advice through the PHA Health Protection Service regarding safe practice in the Court Service as that sector sought to resume in-person trials. The Agency also

supported contact tracing and case management practice within the Police Service of Northern Ireland's own contact tracing procedures which they had retained due to security reasons.

25. Relationships between the PHA and other organisations were generally good and the Agency worked effectively with colleagues in NI and throughout other jurisdictions. I believe there may have been occasions when there were differences of opinion or challenges that placed a strain on particular parties. It is however my view that everyone was trying to do a good job in exceptional circumstances. It was clear early on that the pandemic we had planned for was not the pandemic that we got, this meant that there were challenges for all stakeholders that had not been planned for and sometimes relations became fraught. Overall however I believe that relationships were good.

26. The PHA was not responsible for the development of the TTP strategy in NI. The Agency was tasked with operationalising a number of strands of it, but work on the development of the strategy itself was led by the DoH. Through the planning and implementation process the PHA engaged with a range of colleagues in NI. Given the number of individual providers of primary care, social care including care homes, educational establishments and community and voluntary providers; engagement was often undertaken via representative groups. For example, engagement with primary care providers was facilitated by colleagues in the HSCB who had oversight for these services.

Relationship with the Republic of Ireland

27. The land border with the Republic of Ireland (ROI) posed a unique challenge for the PHA compared to the other Devolved Administrations. The land border offers a means for communicable disease outbreaks to rapidly spread and given the same, the PHA Health Protection Service had well established relationships with colleagues from the ROI. By way of example, in 2018/19 prior to the pandemic, both health protection services had jointly investigated a major cross-border Shigella outbreak. This was the basis upon which cooperative work during the pandemic was built and PHA staff maintained these links throughout the period. The onset of the UK exit from the

European Union had also stimulated the need to develop a Memorandum of Understanding regarding the management of cross-border incidents and outbreaks of communicable disease which was in place in April 2020.

28. As there are two separate jurisdictions on the island of Ireland, it was inevitable that guidance, advice and legislation would differ throughout the pandemic. Differences in approach extended into diagnostic and testing protocols, duration of isolation for cases and contacts, travel restrictions and ultimately the types of vaccine used and the nature and sequence of population covered. This made direct comparison of statistics from both jurisdictions difficult to interpret.

System Readiness

29. In the years prior to 2020, the PHA undertook a range of activities in relation to pandemic planning. The PHA was represented in a number of regional groups that considered the various aspects of pandemic planning and preparedness. This is covered in more detail in the Agency's witness statement prepared for Module One of the Inquiry.

30. Prior to the outbreak of Covid-19, the PHA did not have an IT system that was designed to manage high volumes of cases for contact tracing or case management. The Agency relied on HP Zone (HPZ) which is an established, business as usual product used for the management of all small outbreaks of infectious disease. HPZ was not designed to support the management of large-scale outbreaks such as Covid-19.

31. The PHA Health Protection Surveillance team prior to the pandemic was comprised of four small teams:
    - Gastrointestinal and respiratory diseases;
    - blood borne viruses, sexually transmitted infections, vaccine coverage and vaccine preventable diseases;
    - surgical site infections; and
    - healthcare associated infections and antimicrobial resistance.

32. It was then led by a graduate of the PHE run Field Epidemiology Training Programme. Consultants in health protection provided topic expertise into surveillance programmes. The team used a range of approaches for data collection, processing, storage and reporting. Some parts of the team's work used a statistical programming language to partially automate data processing, reporting and the use of dashboards for sharing intelligence with consumers. The team did not have access to adaptable technological systems for the full automation of data processing and reporting.

33. Data sharing and relationships with bodies both inside and outside of NI was generally good prior to the pandemic. Given NI's small size and land border status, it is imperative that we have good working relationship with colleagues in both the UK and ROI. As a small jurisdiction, local HSC bodes are used to working well together to a common aim as in a health emergency. These relationships were vital when preparing for and managing the Covid-19 response.

34. In respect of data sharing, it would be fair to say that the volume and depth of information governance requirements needed to support new data sharing placed a heavy burden on staff who were also working on actively managing the pandemic. This was especially challenging when working with ROI given their different processes. Whilst the need for due diligence in terms of information governance is accepted, there is a need for this to be proportionate and perhaps adjusted in times of a public health emergency where the speed of implementation is vital to an effective response.

Flow of Scientific Advice

35. During January 2020, reports were emerging from China about a new respiratory infection which was resulting in large numbers of people becoming seriously unwell and dying. Information was coming to the UK from various sources including the WHO. The PHA and the DoH get official information on situations like this from UK bodies and in this case PHE (later UKHSA) was the UK focal point. As already mentioned, the PHA participated in the national IMT led by PHE where information was shared.

Test, Trace & Protect

36. The PHA was involved in the operationalising of the TTP strategy. The PHA was a member of the TTP Strategic Oversight Board which was established by the DoH in May 2020 to oversee and coordinate the integrated programmes and workstreams required to deliver the TTP Strategy. The CMO was the Senior Responsible Officer and Chair of the TTP Strategic Oversight Board. The PHA's role within this was space was essentially to operationalise or support the operationalisation of policy decisions.

37. The PHA was directed to design, implement and undertake the running of a dedicated, large-scale CTS under the leadership of the CMO who retained oversight responsibility of the project. On 1 May 2020, the CMO established a Contact Tracing Steering Group (CTSG) to oversee the implementation of the CTS for NI. Dr Elizabeth Mitchell (then retired Deputy CMO) and Alistair Finlay (QUB) were appointed as joint Chairs of the Group. The remaining members comprised of senior officers from the DoH, the PHA, BSO, the PCC, NICVA and both QUB and Ulster University (Exhibit PHA-7/03 [INQ000474952]) (Exhibit PHA-7/04 [INQ000474977]).

38. In March 2020, the DoH convened an Expert Advisory Group (EAG) on testing which was Chaired by a member of staff from the PHA. The EAG reported directly to the CMO. The key role of the EAG was to develop the NI approach to Covid-19 testing and to oversee/coordinate implementation of testing. Membership of the EAG is set out below (Exhibit PHA-7/05 [INQ000520261]):

- Brid Farrell (Chair), PHA
- Lourda Geoghegan, DoH
- Gillian Armstrong, DoH
- Sinead McGuinness, PHA
- Sarah Buckley, Pathology Network Manager
- NR Adept Fellow, DoH
- Conall McCaughey, Belfast HSCT Virology lab

- Martin Brown, Southern HSCT
- NR Retired Public Health doctor and Consultant Epidemiologist
- Prof Ian Young, DoH
- Prof Stuart Elborn, Universities/AFBI consortium
- Myles O'Hagan, Procurement and Logistics Service
- Jillian Johnson, PHA

39. Whilst the PHA was represented on both the CTSG and the EAG, policy responsibility for issues relating to contact tracing and testing remained with the DoH.

40. Throughout the period covered by this module, the PHA retained responsibility for supporting outbreaks of Covid-19 in care homes through its established processes for other infectious diseases.

41. The TTP strategy was designed specifically for NI so whilst the PHA continued to attend UK-wide meetings and briefings on the pandemic, the engagement on the implementation of TTP was more limited. The PHA was represented at meetings on testing under the National Initiative as leaders of the EAG. Senior PHA staff leading the contact tracing programme also met regularly with counterparts in Scotland and Wales to discuss operational challenges with tracing and improvement processes. Engagement with Health Protection consultant counterparts from the ROI in relation to the management of outbreaks in border areas and wider issues in respect of travel took place throughout the pandemic.

Data and Decision Making

42. The PHA was the data controller for the personal data used in the CTS. CTS data was used for several purposes:
    - To contact a confirmed case in order to provide public health advice and to seek information on others that they had been in contact with;

- To contact those individuals who had been in contact with someone who had tested positive to provide public health advice to self-isolate and seek a test if symptomatic in order to prevent further transmission of the virus;
- To identify and manage clusters of disease; and
- To inform surveillance of the disease.

43. Some data was shared with other UK countries and the ROI where a confirmed case or contact had travelled between jurisdictions.

44. A contact tracing information system (CTIS) was developed to support the running of the CTS, alongside which sat an analytics platform that was developed to support the analysis of large volumes of data and facilitate NI level estimates of the reproductive number ("R"). The CTIS and analytics platform went live in May 2020 and was refined throughout the pandemic as policy and operational changes were made. The information system and associated analytics platform were developed through and facilitated by the Digital Test Trace and Protect (DTTP) programme which was led by the DoH Chief Digital Officer. The DTTP programme brought together key stakeholders which included the DoH, PHA, BSO and an NI based software company (Kainos).

45. The PHA provided a range of reports to the DoH using data and these are set out below:

Weekly Contact Tracing Service Management Information Updates

The CTS published Weekly Contact Tracing Service Management Information Updates with data on the following:

- The number of new positive case added to the contact tracing system
- The number of positive cases not reached
- The number of close contacts identified
- The number of close contacts reached and not reached
- The number and proportion of positive cases reported to the contact tracing service that were reached within 24 and 48 hours

- The number and proportion of close contacts reported to the contact tracing service that were reached within 24 and 48 hours

In addition to the above information that was provided publicly, the CTS provided the following information on a weekly basis to the DoH:

- Cumulative data on cases and contacts reported to the contact tracing system from May 2020
- Average number of contacts per case (up to April 2022)

Weekly Contact Tracing Service Outbreak/Cluster summary

The CTS reported on the number of outbreaks and clusters by setting over a four-week period. In addition, the CTS provided cumulative data on outbreaks and clusters identified by the contact tracing system from May 2020 on a weekly basis to the DoH.

46. The CTS did provide information and data on issues such as case numbers, testing, numbers of close contacts and outbreaks and clusters. This information was conveyed to various stakeholders in a range of ways:

- At formal meetings chaired by the CMO, like that of the TTP Strategic Oversight Board, the Covid 19 Vaccination Board and the International Travel Programme Board. The PHA also attended fortnightly meeting of the Digital TTP Board chaired by the DoH Chief Digital Officer;
- Daily situation reports shared with senior DoH and PHA staff on the numbers of cases and contacts managed in the CTS;
- Daily (Mon-Fri) situation reports from the Health Protection Acute Response Team shared with senior DoH and PHA staff on current issues and outbreaks;
- Twice weekly situation reports to local council Chief Executives and Chief Environmental Health Officers;
- Weekly and monthly epidemiological bulleting published on the PHA external facing website;

- Weekly reports to DoH officials on the number and types of calls handled on the Covid Care telephone service established as part of the CTS and operated by NI Direct;
- Weekly online in-person information exchange on outbreaks;
- Provision of data to the Covid-19 modelling group on a daily basis throughout most of the pandemic;
- Operation of the nosocomial dashboard as members of the Nosocomial Support Cell;
- Weekly Covid-19 Data Overview Report / Early Warning Internal Report which was produced between PHA HP Surveillance staff and CTS staff and fed to senior PHA staff for Internal use.

Testing

47. The only Covid-19 testing available in March 2020 was through HSC laboratories in Trusts (also known as pillar 1). The challenge in March 2020 was to increase testing capacity rapidly and as mentioned earlier in this statement, the DoH convened the EAG to increase testing capacity in NI. An academic consortium was also established as part of the EAG to support increased testing capacity in HSC Trust laboratories and provide additional resilience to Trust polymerase chain reaction (PCR) testing capacity. The consortium also undertook seroprevalence studies. The consortium included QUB, University of Ulster, Western HSC Trust/C-TRIC Agri-Food and the Biosciences Institute

48. To address the challenges posed by limited testing capacity, priority groups were agreed for testing which can be found in the testing guidance issued on the 19 March and updated on the 26 March. This guidance was initially co-ordinated by the PHA who convened a task and finish group with HSC Trust representation to develop the guidance. The guidance aimed to provide an objective justification for testing based on existing testing capacity and took account of emerging knowledge about Covid-19 and the approaches being taken in the other nations. As the pandemic progressed new types of tests became available and were included in the guidance which was issued through the CMO's office.

49. The National Testing Initiative (NTI) was operationalised on the 4 April 2020, with the intention initially that testing capacity would be used to test key workers and health care workers (HCW). This was to protect Trust laboratory capacity as a separate supply chain for testing supplies and reagents was used in the NTI. HSC Trust Chief Executives indicated at a meeting on or around 8 April 2020, that they wanted to test their own staff and expressed concerns about the turnaround time for results from the NTI compared to their own laboratory services. While their concerns were understandable, not all HSC Trusts had adequate laboratory testing to do this.

50. Initially only one Trust laboratory (Regional Virology Laboratory) in the Belfast HSC Trust was able to test for Covid-19 but over the following weeks the remaining four laboratories in NI were able to test for Covid-19. Testing was scaled up from 40 PCR tests per day in January 2020 to 736 PCR tests per day at the beginning of April 2020. The number of tests carried out each day depended on the number of swabs received, availability of testing reagents and testing kits.

51. In view of the pressures on laboratory systems arising from Covid-19 testing, a uniform approach to the prioritisation and delivery of laboratory workload was adopted by the HSC to maintain high standards of pathology testing. This work was taken forward by the NI Pathology Network.

52. NI did not use the lighthouse laboratories in the UK during the pandemic except for one occasion which arose in early May 2020 when the processing capacity of the pillar 2 laboratory provider (Randox Laboratories Ltd) was reduced from approximately 17,000 samples per day to approximately 3,000 samples per day as a result of a number of a safety cabinets being used to store Covid-19 test swabs malfunctioning. The reduced processing capacity, created a backlog which necessitated the shipping of approximately 14,000 samples to the Milton Keyes lighthouse laboratory.

53. As a result of the backlog, approximately 1,100 samples that arrived at the Randox laboratory on 30 April and 1 May 2020 were voided - affected individuals were contacted to inform them of their void results and asked to book a re-test. These voided samples were from multiple pillar 2 testing channels, including regional testing sites in NI, home-test deliveries, mobile testing units and satellite test deliveries. With the agreement of the pillar 2 service, for three to four weeks following the emergence of the problem, NI samples were diverted to the Glasgow lighthouse laboratory until issues in relation to the malfunctioning safety cabinets were resolved.

54. At the outset of the pandemic decisions regarding the use of private sector laboratories for pillar 2 testing were made by the UK Department of Health and Social Care (DHSC). Aside from the occasion set out in the previous paragraphs, Randox Laboratories Ltd was the only provider of pillar 2 testing used in NI.

55. QUB also developed Loop-mediated Isothermal Amplification (LAMP) laboratory testing for HCWs and provided whole genome sequencing (WGS) for both pillar 1 and pillar 2 tests (Exhibit PHA-7/06 [INQ000474974]).

Development of testing capacity

56. It is important to note that pillar 1 testing capacity was never exhausted throughout the pandemic. The academic consortium provided resilience to pillar 1 and had the capacity to increase testing further if needed as the pandemic developed. This was never required but it was important to have that resilience in the pillar 1 laboratory system.

57. The roll out of pillar 2 testing was effective in bringing testing to key workers and the general public. The ability to deploy mobile testing units to areas with increased numbers of cases and outbreaks within workplaces was used throughout the pandemic. The PHA had good operational working relationships with the private provider (SERCO) who delivered the pillar 2 service throughout the pandemic. Given that Randox, the private laboratory

used for pillar 2 testing was based within NI, turnaround times for results were generally good within the region.

58. The introduction of point of care testing (POCT) in hospital settings in December 2020 /January 2021 was important for the Alpha variant wave of the pandemic as it facilitated effective ambulance triage and effective separation of positive and negative Covid-19 patients within HSC Emergency Department's helping to reduce the risk of spread of infection. This was achieved through the use of Lumira antigen testing in hospitals, a rapid 12-minute POCT that detects the nucleocapsid protein antigen of SARS-CoV2. POCTs provided a means to rapidly turnaround test results so that appropriate treatment could be actioned without the need to send results to the laboratory.

Utilisation of testing capacity

59. Pillar 1 laboratory systems do not have an associated booking platform which meant that spare capacity could not be offered to non-health sectors. While workarounds were developed during the pandemic, a booking platform would have made this process easier and more efficient. A booking platform would have provided a mechanism for data capture, enabling HCW status and key worker status to have been recorded which could have been relied upon by HSC Trust occupational health services.

60. The regional virology laboratory was dependent on the Roche testing platform which was a high throughput testing platform in place before Covid-19. At the onset of the pandemic, there was a UK wide shortage of Roche testing kits and this resulted in testing kit supplies being allocated on a weekly basis to NI with supplies of kits commonly running out by Thursday and Friday of a given week. As a result of these shortages, instead of being able to use the high throughput machines in the regional virology laboratory, testing platforms from other providers (Seegene Inc, Thermo Fisher Scientific Inc, PerkinElmer) had to be used until availability improved in year two of the pandemic. DHSC, in association with PHE, were responsible for the allocation of Roche testing kits within NI. In the interests of fairness, testing kits were allocated on a

weighted population basis with NI receiving a slightly higher share compared to the other Devolved Administrations due to the region's higher reliance on the testing platform.

61. In respect of pillar 2 tests, there was no booking platform in the early weeks of operation. When pillar 2 testing became available, at the beginning of April 2020, HSC key workers were the priority group for testing. The PHA co-ordinated access to the testing service by completing a spreadsheet which was uploaded to a secure sharefile the day before testing. Management of the spreadsheet was labour intensive and involved working with the test centres to book slots and liaising with key workers and their families to inform them of their appointments, given the same, testing capacity in pillar 2 was not used as effectively as it could have been in the early weeks of operation.

62. During late April 2020, the process became easier and utilisation improved with the opening of the UK Government's Employer Referral Portal which allowed employers to refer essential workers who were self-isolating either because they or member(s) of their household had coronavirus symptoms, for testing. Once referred through this portal, essential workers received a text message with a unique invitation code to book a test for themselves (if symptomatic) or their symptomatic household member(s). The booking platform for members of the public to book tests opened on the 18 May 2020.

63. When additional testing capacity became available within HSC Trusts, there were concerns raised by Departmental officials that the capacity was not being used completely every day in relation to HSC testing as a means to address high levels of staff absence.

64. As already mentioned, at the outset of the pandemic HSC laboratory IT systems did not record information about whether the person being tested was a HCW or not. To address the information needs of the DoH, daily information on testing numbers broken down by patient and HCW status was compiled by the PHA and provided to the DoH. This process was based on a

manual data collection form where a member of staff contacted the individual laboratories and obtained the information directly from them.

65. Testing advice was issued via the CMO on the advice of the EAG on testing, the membership of which I have set out earlier in this statement. The guidance aimed to provide an objective justification for testing based on existing testing capacity and took account of emerging knowledge about Covid-19 and the approaches being taken in the other nations.

Booking tests

66. The public facing booking platform for the NTI went "live" on 18 May 2020 allowing symptomatic members of the public to book a Covid-19 test through an online portal. Prior to this date, there was limited access to testing for the general public unless they were identified as a key worker or HCW.

67. The PHA had no input into the first iteration of the booking platform, however the Agency was involved whenever modifications were made to the questions on the booking platform to ensure that they were consistent with the extant testing guidance in NI.

Testing technologies

68. The co-ordination of the introduction of new testing technologies was undertaken by the EAG on testing.

69. When a new testing methodology was proposed and considered by the EAG as viable within NI, the regional virology laboratory validated the test and provided guidance as to how it should be used (Exhibit PHA-7/07 [INQ000474975]). In the case of Lateral Flow Tests (LFT) the NI Pathology Network developed the standard operating procedures (Exhibit PHA-7/08 [INQ000474953]).

70. Regarding the following tests:

- PCR - Validation undertaken by the Regional Virology Laboratory in the Belfast HSCT.

- LFTs - By December 2020, LFT's were available and were introduced for testing HSC staff who had travelled from Tier 4 or other 'high risk' countries. At this time, the PHA established a pilot programme of asymptomatic testing of all healthcare staff using LFTs. The pilot was completed in February 2021 and the PHA worked on protocols and guidance for the wider rollout of the programme to both primary and secondary care which was signed off by the NI Pathology Network before issue. This pilot included all aspects of operationalising the policy such as adapting 'instructions for use' leaflets, discussions on HSC Trusts obtaining and distributing tests and developing web resources for staff.

- LAMP - LAMP testing methodology was validated nationally and reported to be effective on the 1 December 2020, following the completion of a technical and clinical evaluation conducted for the DHSC by a number of NHS trusts and universities. LAMP testing was an effective method as it was accurate and sensitive enough to detect Covid-19, including for those without symptoms. LAMP testing of HSC staff commenced on the 10 December 2020, initially by way of a pilot exercise within the Belfast HSC Trust. The EAG on testing supported the development of the programme of LAMP testing for HSC staff. LAMP testing was undertaken primarily because QUB laboratory capacity was available, QUB staff were familiar with the technology and it was felt to be useful to offer in addition to LFT and PCR tests. This technology offered an easy to use test that may have been preferable for staff who were expected to test frequently as well as those who struggled with nasal and throat swabs. There were however challenges in relation to LAMP testing as a result of its reliance upon saliva samples rather than throat swabs used with LFT and PCR tests. As the pandemic evolved, individuals had become accustomed to throat swabs and in some instances preferred them to saliva tests. Some individuals also had difficulty producing saliva samples for LAMP testing. The main limitation, was in relation to the IT infrastructure which was resolved through the implementation of the Lantern IT System developed by the Royal Free Hospital (London). On a wider note, staff from the PHA Education Cell also worked closely with the Department of Education

(NI) and the Education Authority in relation to school Covid-19 testing programmes. Regular asymptomatic home testing using lateral flow devices was made available to pupils and staff in accordance with the recommendations. Weekly LAMP testing was introduced for all special school staff and students starting in February 2021, as this method of testing avoided the need to take repeated swabs from children with special needs. The use of LAMP tests was deemed to have contributed to reducing the rate of infections in special schools as it helped to identify cases either before they were symptomatic, or asymptomatic cases, allowing immediate self-isolation, thereby reducing potential for wider transmission, both within the school and in the contact groups of pupils and staff. NI was the only part of the UK to provide this service to all its special schools. The LAMP service was discontinued in March 2022 when funding ceased.

- WGS - The aim of WGS of SARS-CoV-2 is to provide an end-to-end service incorporating both laboratory testing, complex analysis and provision of results in a timescale that meets the needs of clinical care, public health interventions and policy decision-makers. In April 2020, the clinical laboratory team in the Regional Virus Laboratory (RVL) initiated a WGS project for the SARS-CoV-2 virus as part of the national COG-UK surveillance program. Within three weeks the RVL team had prototype WGS for the virus in place, working in collaboration with QUB. By the end of April, the Belfast team were submitting viral genome data to the COG-UK program, and by December 2020 over 2,000 SARS-CoV-2 genomes from NI had been sequenced. As the pandemic evolved, the Belfast HSCT worked collaboratively with QUB to undertake WGS of suitable hospital samples. QUB undertook WGS of pillar 2 positive samples. On the 21st January 2021, the European Centre for Disease Prevention and Control advised that the risk associated with the introduction and community spread of variants of concern had been increased to high/very high. The variants were of public health significance as they may have different characteristics in transmissibility, severity, identification using standard assays, response to convalescent or vaccine immunity, and response to therapies. The PHA conducted a desktop exercise on the 18 February 2021 to test the PHA New SARS-CoV-2 variants and mutations

interim plan on required actions for the Agency. A number of learning points were identified by the PHA following this exercise (Exhibit PHA-7/09 [INQ000474954]). In 2021, as new variants emerged, the PHA developed an Interim Plan for new Variants and Mutations (Exhibit PHA-7/10 [INQ000474945]). A daily sitrep was submitted to the DoH (Exhibit PHA-7/11 [INQ000474946]). In addition, two new surveillance reports were published weekly; The Whole Genome Sequencing Report on Variants of Concern and Variant Under Investigation report (Exhibit PHA-7/12 [INQ000474947]) and The Reflex Assay Variants and Mutations report (Exhibit PHA-7/13 [INQ000474948]). Reflex assays were able to identify potential variants before WGS results were available.

- Wastewater Testing - The QUB Wastewater-based Epidemiology programme submitted regular reports and provided a dashboard to stakeholders for its wastewater SARS-CoV-2 surveillance programme. QUB later provided a data flow to the PHA to support integration of intelligence with other indicators. The NI SARS-CoV-2 wastewater-based epidemiology (WBE) programme was operationalised by QUB in March 2020. The programme developed methods, systems and laboratories for wastewater analysis. The programme also developed monitoring of influenza, respiratory syncytial virus, adenovirus F41, enterovirus D68 and poliovirus. The outputs of the WBE programme are shown in the following table:

Product name	Summary
SARS-CoV-2 WBE Dashboard	QUB dashboard for visualisation of levels of SARS-CoV-2 over time and by area.
Weekly SARS-CoV-2 WBE Report	QUB weekly summary report to key stakeholders showing SARS-CoV-2 levels over time and by area.
Public Health Agency Weekly COVID-19 Epidemiological Bulletin and Internal Daily COVID-19 Intelligence Report	WBE data are summarised in public and internal reports at different timescales as a proxy for prevalence to inform risk assessment.
Validation of WBE as a proxy for COVID-19 incidence and prevalence	Statistical analyses undertaken by QUB demonstrating the utility of WBE as an indicator of growth trends and prevalence.

SARS-CoV-2 variant detection and analysis	Use of WBE to measure the relative prevalence of SARS-CoV-2 lineages in the community and to detect novel variants arising and evolving in NI.
WBE Influenza Surveillance	Expansion of the WBE programme to demonstrate trends in influenza prevalence.
WBE Respiratory Syncytial Virus surveillance	Expansion of the WBE programme to demonstrate trends in RSV prevalence.
WBE Enterovirus D68 Surveillance	Expansion of the WBE programme to demonstrate trends in enterovirus D-18 prevalence.
WBE for Human Adenovirus F41	Expansion of the WBE programme to demonstrate trends in Adenovirus F41 prevalence, in response to hepatitis of unknown origin outbreak in children.
WBE for Polio	Expansion of the WBE programme to detect the presence poliovirus in NI, should it be present, following its detection in London and New York.

The NI SARS-CoV-2 WBE programme demonstrated correlation between wastewater viral levels with infection episodes and Office of National Statistics positivity levels, providing useful information on the emergence of new variants. A number of pilots were undertaken, moving the programme beyond SARS-CoV-2 to the investigation of other pathogens. WBE may have a role in future pandemics or viral outbreaks, potentially providing early intelligence about a range of scenarios, based on pathogens being tested.

71. Advice in relation to testing technologies was provided by the EAG on testing. When new testing technologies were available, their suitability for use in NI was initially considered by the EAG and if deemed promising each given test was validated in a local laboratory.

72. Regarding the accuracy of the following tests:

- PCR – validation of PCR testing was undertaken by the Regional Virology Laboratory in the Belfast HSCT to which the PHA had no input. The analytical sensitivity (ability within the lab to detect a SARS-CoV-2 positive sample of RT-PCR) was high, PCR specificity for virus was also high. Retesting with PCR was not recommended within 90 days of a positive test because of residual virus from a previous infection could result in a false positive. During the pandemic PCR was

used for symptomatic and asymptomatic testing (as in care homes). During 2021, genotyping (reflex assays) was introduced alongside PCR testing into both hospital and community testing laboratory networks in order to test for specific mutations in known variants. This enabled an early warning system (usually within 24 hours of a positive PCR result) ahead of definite results from WGS.

- LFT - these enabled rapid point-of-care or self-testing for live infection when people are most infectious, with results appearing on the device within 10-30 minutes. Although less sensitive than PCR tests, LFTs were better at identifying positive results in people with medium and high viral concentrations. At the highest viral concentrations, that is the most infectious, the sensitivity was 84.5%. LFTs were less effective at detecting people with a low viral concentration, but this was considered acceptable as these people were less likely to be infectious. The ease of use and speed of results of LFT had to be balanced with the need for results to be carefully interpreting.

- LAMP testing - DHSC confirmed in December 2020 that OptiGene RT-LAMP tests were accurate and sensitive enough to be used for Covid-19 testing, including for those without symptoms (Exhibit PHA-7/14 [INQ000474949]). Additional evidence supporting the effectiveness of LAMP was also available to the Agency (Exhibit PHA-7/15 [INQ000474950]).

Roll out of testing

73. On 4 April 2020, the first drive-through centre for Covid-19 testing was operationalised in Belfast, followed by Derry and Craigavon as part of the NTI. The PHA worked with the national initiative to identify sites for testing and the location of walk through testing sites. The Agency also advised where mobile testing units should be located throughout the pandemic based on Covid-19 numbers in a locality or in response to an outbreak in a work setting as

advised by the CTS. In the absence of a public booking platform, the booking of tests was co-ordinated by the PHA for key workers including HCWs and independent sector workers. The NTI used Randox Laboratory to test samples

Mass Testing

74. The PHA did not undertake mass community testing for Covid-19 akin to the strategy used in Liverpool (UK) during 2020/21. With the emergence of the Delta variant in June 2021, enhanced testing was however carried out in neighbourhoods within Kilkeel, a rural town in NI. This exercise was initiated based on the results of reflex assay testing which suggested the Delta variant was circulating within the area. Similar initiatives on smaller scales were also undertaken in other towns within NI in response to rising cases of the Delta variant until it became clear that enhanced testing would no longer slow community transmission of the virus. Enhanced testing was an attempt to slow the spread of the virus so that more people could be vaccinated. When the virus had spread across NI in significant volume, enhanced testing was no longer an effective measure.

75. Health Inequalities in testing were addressed through:

- the availability of local testing facilities. These consisted of drive through testing facilities, walk through facilities and mobile testing units that could be deployed for the management of outbreaks in localities with increased number of cases, outbreaks and workplaces. Public health information messages were designed to be culturally relevant to reach diverse communities;
- Engagement with local community groups through regular messaging via health improvement networks across NI;
- Real time data monitoring to track positive cases by age group and postcodes;
- Home testing kits were available for those with difficulty accessing testing sites including the elderly, disabled individuals and those with underlying conditions.

Sector Testing

Healthcare workers

76. Regular asymptomatic testing of HCWs was available with LFTs and LAMP testing technologies. LAMP testing of HCWs was only available in two HSC Trusts.

77. By December 2020, LFTs were available and were introduced for testing staff who had travelled from Tier 4 or other 'high risk' countries. This work was led by the PHA working with the HSC Trusts as already set out.

Care Home Testing

78. The PHA Health Protection team had established systems in place to monitor infectious diseases and provided direct advice and support to manage and contain outbreaks in care homes. These arrangements were in place when the Covid-19 pandemic was declared. In the initial stages of the pandemic all notifications of respiratory illness from care homes to the Agency's Health Protection Duty Room were investigated and a risk assessment undertaken of the incident.

79. Testing for Covid-19 in care homes was initially facilitated by the Regional Virology Laboratory. The case definition criteria for testing was agreed at a four nations level and was endorsed by the DoH for local implementation. As new clinical evidence emerged in relation to atypical presentations in vulnerable and older populations, the case definition was expanded. This served to alert clinicians and care homes to the need for a higher index of suspicion regarding possible atypical Covid-19 presentations. Following expansion of the case definition for the care home population, Covid-19 guidance was amended to advise that all residents in care homes with atypical symptoms should be managed as probable positive cases. In such circumstances, care homes were asked to ensure implementation of all appropriate IPC procedures.

80. The PHA conducted a surveillance study in April 2020 in a sample of care homes to confirm the potential for transmission from symptomatic,

pre-symptomatic, and asymptomatic individuals. Findings highlighted that testing only symptomatic residents and staff would not identify all individuals with SARS-COV2. This work informed the NI policy for testing all residents and staff for Covid-19 in care homes with new outbreaks regardless of symptoms.

81. On the 24 April 2020, whole home testing was introduced for care homes with a new outbreak. Initial pillar 1 testing was undertaken to determine the extent of the outbreak with all staff and residents tested on day 0 and then followed up on days 4 - 7. Pillar 1 testing was used due to the rapid turnaround for results (less than 24 hours) which facilitated early IPC intervention. HSC Trusts were responsible for oversight of initial care home outbreak testing at day 0 and days 4-7. HSC Trusts provided labels, test kits and supporting administration for outbreak testing as well as supporting administration of the tests (nose & throat swab) as required. The PHA Duty Room supported risk assessment of the outbreak and advised on scope of testing.

82. In early May 2020, a whole care home testing policy was applied retrospectively to all open outbreaks notified prior to 24 April 2020 and not closed on or before 7 May 2020 (92 homes). An additional 23 care homes had outbreaks notified prior to 24 April 2020 but were closed on or before 7 May 2020. In late May 2020, a decision was taken to test all staff and residents in care homes. On 13th June 2020, the then Minister advised that all staff and residents in Care homes should be tested before end of June 2020.

83. As a precautionary approach the DoH, on the advice from the EAG revised the testing policy in care homes to introduce a programme of regular testing in all Covid-19 free care homes, this was supported by a booking platform that care homes used to order tests. On 28 July 2020, a letter was issued to announce the implementation of a planned programme of regular Covid-19 testing for all residents and staff in care homes, with staff being tested every 14 days and residents every 28 days. This programme came into effect on Monday 3 August 2020 with updated operational guidance issued shortly thereafter. On 3 November 2020, the then NI Health Minister announced that

regular testing of staff was to increase from once every two weeks to once a week. Testing arrangements were extended in December 2020 to facilitate PCR testing for visitors and care partners to care homes over the Christmas period. Testing was facilitated as part of regular weekly testing in care homes and at drive through and mobile community test sites. A letter from the CMO was issued on the 18 December 2020 to update on Covid-19 testing arrangements for nursing and residential care homes. Regular PCR testing for care partners was established as part of care home weekly regular testing in February 2021.

Reporting of Test Results

84. Positive Covid-19 tests were provided to the CTS by the Central Test Registry (CTR). The CTR is part of the existing HSC data warehouse and included Covid-19 results received from HSC Laboratory Information Management Systems and the NTI. Results from the NTI were centrally collected and then distributed to regions via the National Pathology Exchange; only those test results relating to Northern Irish residents were sent to the CTR.

85. Results from the two sources contained different data sets with neither set providing all the information required for contact tracing. One of the purposes of the CTR was to provide a complete dataset. The registry received all Covid-19 test results (both positive and negative) from the various laboratory sources, combined the results into a single register which matched test results to patient demographics and enhanced the datasets by acquiring matched telephone numbers and any next of kin details, from existing HSC information systems.

86. The CTR provided a data extract of positive Covid-19 test results (only) to the CTIS. This extract was transferred within the secure HSCNI network. The extract was sent 7 days a week at 6 allotted times: 06:00, 08:30, 10:35, 12:40 15:00 and 22:00. Timing intervals were easily scaled up and down as required by the CTS.

Tracing

87. During the early stages of the pandemic, contact tracing was one of many functions of the PHA Health Protection Team. The PHA Health Protection Team would have been providing advice to individuals and organisations in relation to Covid-19 alongside other non Covid-19 related work, contact tracing did not have primacy over other work at that point.

88. As already mentioned, electronically during the very early stages of the pandemic, the management of Covid-19 outbreaks was undertaken using HP Zone (HPZ) which is an established, business as usual product used by the PHA for the management of all small outbreaks of infectious disease. HPZ is primarily a case management system rather than a data source for surveillance purposes or a dedicated system to manage large-scale contact tracing. Although it continues to be used in the PHA for smaller scale outbreaks, work is ongoing to identify and implement a replacement system that would be better placed to provide up-to-date time-critical outbreak situation monitoring and reporting

89. The PHA was not involved in discussions about the decision to stop contact tracing in March 2020. It is my understanding that this decision was conveyed to the PHA by the CMO on the basis that contract tracing was to be stopped on a UK wide basis in line with an announcement from the then Prime Minister.

90. The PHA did not express any concerns about the decision to cease contact tracing at this point as it was a decision made at a policy level by the DoH.

Contact Tracing Pilot

91. At the beginning of April 2020, the CMO convened a meeting with the PHA and requested that the Agency put in place pilot arrangements for the operationalisation of a large-scale contact tracing service in anticipation of a new wave of Covid-19 cases. The pilot was to be complete within a very short time frame during which 76 staff were trained to carry out contact tracing.

92. Staff for this pilot were recruited from within the HSC, largely from the PHA but also from RQIA and the HSC Leadership Centre where a number of staff had been identified as suitable for redeployment as they did not perform "frontline" duties.

93. Approaches from NI Universities and local council Environmental Health Services had been made to the PHA prior to the establishment of the pilot service and a process was developed to capture volunteer offers and draft job descriptions which facilitated the movement of a small number of staff. Progress with external offers of employment required additional work and was not completed in time for the pilot launch on 27 April 2020.

94. As previously set out, the CTSG was created to oversee the implementation of a CTS for NI. The Group was jointly chaired by Dr Elizabeth Mitchell (retired Deputy CMO) and Alistair Finlay (QUB) with the PHA in attendance alongside a number of other organisations.

95. The initial pilot had not provided a complete proof of concept for a large-scale tracing service. It had not had time, for example, to design and develop a dedicated IT platform for recording cases and contacts. The role of the CTSG was to bring all other aspects of the service to fruition - as well as IT, this included consideration in relation to Human Resources, estate/facilities, information governance and the creation of a Covid-19 telephone helpline service.

96. The key aims of the CTSG were to:

- Deliver an extensive and comprehensive CTS for NI;
- Confirm the service model to include traditional contact tracing and technology enabled elements;
- Oversee the recruitment of suitably experienced staff/volunteers;
- Provide appropriate IT platforms to support the work;
- Identify and secure resources and facilities for the service; and
- Identify appropriate governance, project management and administrative support for the service.

97. The CTSG was established by the CMO as the DoH took a more direct approach to managing the pandemic. It was recognised that in order to deliver a regional service, capable of managing several hundred cases each day would require cross-organisational, multi-disciplinary working and that this is most efficiently facilitated via the DoH having direct oversight of the programme. It would be usual and appropriate for the DoH to establish such steering groups where a number of regional organisations would be called to work together at pace and scale.

98. The CMO was the Senior Responsible Officer for the Contact Tracing Project and also the Chair of the Test, Trace, Protect Strategic Oversight Board which was established to oversee both the contact tracing and testing programmes.

99. When the CTSG was established to develop the large-scale tracing service, it was acknowledged that contact tracers would work as an extension of the wider PHA multidisciplinary team comprising of Consultants in Health Protection, Health Protection Nurses and Surveillance Officers. Given the expected parameters of the role, it was agreed by the Steering Group, that contact tracers needed to have experience in either a field related to public health or health and social care services as a practitioner, experience as contact tracer or experience working for a regulator.

100. The first business case in relation to the Covid-19 CTS was predicated on having to trace an average of 50 cases per day with the ability to scale up or down as demand required. As far as I have been able to ascertain, the reason for using 50 cases as a standard was due to the availability of testing in April/May 2020 when the business case was drafted. My understanding is that colleagues calculated that with a positivity rate of 5%, test numbers would have to rise to around 1,000 per day in order to find 50 cases and given that test availability was significantly lower than that at the time this was deemed a reasonable worst case. The business case was reviewed in June 2020 to cover 100 cases per day and also included forecast costs should case numbers rise to 500 a day in line with DoH modelling should R rise above 1.

It should be noted that in the period following the first lockdown, cases in NI did not reach 50 per day and in summer 2020 case numbers were often in single figures.

101. In September 2020, cases did rise to over 4,000 for the month and the Agency increased its contact tracing hours from approximately 700 tracing hours a week to approximately 1,500 tracing hours a week by month end. The increase was made possible through a combination of recruitment, the use of additional and overtime hours from existing staff and a reliance on a bank list of contact tracers that the Agency had been building by way of resilience planning.

102. The CTSG was stood down in September 2020 and operational control of the CTS was handed over to the PHA. The Steering Group leads submitted a paper to the CMO setting out the rationale for standing down the group. The decision to stand down the group was made by the chairs in agreement with the members. The decision was taken as the CTS had been established and there was no more work for the Steering Group to do as it had achieved its objective.

Contact Tracing Service (CTS)

103. The CTS was made up of three component parts:
    - The "manual" Tracing Service whereby calls were made to the index case and their close contacts to provide them with advice on self-isolation and sources of support;
    - The digital offer which included a Self-Trace platform and the various apps such as the StopCovidNI proximity app or the symptom checker; and
    - A telephone-based service provided by NIDirect which acted as a proxy for people unable to use online resources to book tests or check symptoms. This service was designed with the needs of citizens with particular needs, such as the elderly or those without digital resources, in mind.

104. The manual CTS operated between 8am to 9pm, seven days a week including both bank and public holidays. Although both the pilot and full CTS relied on redeployed staff, as the service developed recruitment exercises for both substantive and bank staff where undertaken using an agreed job description which was matched at Agenda for Change (AFC) Band 6 level. The work of the contact tracers was supplemented by a number of clinical leads who were available to provide advice when complex issued emerged.

105. As the CTS expanded, its staff complement changed and a number of managers were appointed to oversee the day to day running to the service. These managers were supported by several contact tracing team leads, AFC band 7 level staff who had line management responsibility for the contact tracing staff. Given the size of the CTS and the number of calls being made on a daily basis, a team of Quality Coaches were introduced to ensure that calls were being made in line with the agreed script in operation at any given time. Quality Coaches undertook their roles primarily by listening in on live calls being provided by contact tracers and providing feedback and avenues for improvement where necessary (Exhibit PHA-7/16 [INQ000474961]). All were supported by administrative staff and fell under the leadership of the Director of Contact Tracing and her deputy (Exhibit PHA-7/17 [INQ000326136]).

106. Productivity within the CTS was monitored on a live basis on both a collective and individual contact tracer basis. Through an electronic dashboard, managers within the CTS could see the number and duration of calls being made against the number of outstanding cases which had yet to be called. Managers could also see the productivity of individual contact tracers and when this was below expected volumes contact tracing team leads where expected to check in with their staff to provide support where necessary.

107. The CTS received a daily update on the numbers of tests taken via the NTI which allowed them to estimate the number of positive cases likely to be received, using the positivity rate at the time, in the next 24/48/72 hours. Where high case numbers were expected, managers in the CTS flexed

capacity by offering additional/overtime hours to existing tracing staff and utilising the large bank list of contact tracers who worked on and as and when needed basis.

108. During the operation of the CTS, activity was measured primarily against the number and percentage of positive cases reached within 24 hours and 48 hours of having been received by the service. This information was published on a weekly basis by the CTS (Exhibit PHA-7/18 [INQ000474962]).

109. The number of contact tracing staff required varied considerably throughout the pandemic and was dependent upon the positivity rate, dominant variant in circulation and wider societal restrictions in place. The whole time equivalent, headcount and contractual position of the contact tracing workforce were monitored throughout the pandemic response and discussed often with senior PHA and DoH through the Oversight Board. The staffing of the CTS was sufficient for the majority of its operation and the service was able to flex to meet demand until case numbers rose to over 1,000 per day at the end of September 2020.

110. The majority of contact tracing recruitment took place through the HSC Workforce Appeal where staff were appointed on both a substantive fixed term contract or bank only contract. The substantively employed CTS workforce was supplemented at various stages of the pandemic by cohorts of PHA staff who were redeployed to bolster the service during periods of high case numbers.

~~111.~~ During the summer of 2021, in anticipation of a sharp increase in case volumes, the CTS model was adapted to one in which all cases were triaged upon receipt and non-complex ones allocated to a tier of Contact Tracer Technicians who were remunerated at AFC band 4 level. This cohort of staff were primarily comprised of year two medical students, many of whom where available to vaccinate if required.

NI Direct Covid Care Telephony Service

112. Although the NHS 111 service did not extend to NI at the time of the pandemic, it did receive calls from NI residents. In order to maintain as simple a process as possible, callers to the 111 service from NI were auto-diverted to NI Direct.

113. The telephony service was initially designed to serve citizens who were unable or unwilling to use digital products such as the symptom checker and test booking platform. This was a particular consideration in respect of the elderly NI populous or those in digital poverty without easy access to smart phones or devices to use digital platforms.

114. In respect of activity, the CTS received weekly management information reports from NI Direct, which were shared with both the DoH through the TTP Oversight Board and with data scientists supporting the work on calculating R. The information was also used as part of managing the contract with NID in terms of time taken to answer calls, calls dropped etc.

App Technology

115. The PHA was represented on the Digital TTP Programme Board which was Chaired by the DoH Chief Digital and Information Officer.

116. In respect of the Stop Covid App, when an NI citizen received a positive Covid-19 test result via the NTI, they received a number of text messages. One provided the positive result and signposted the individual to NI Direct where the most up to date guidance was published. Another provided a code for entry into the Stop Covid App, this on the assumption that the individual had downloaded it. This act triggered the operation of the app whereby it would alert the phones of people who had been in close proximity to the positive person within the relevant previous period of time. The CTIS was updated to provide contact tracing staff with the capability to generate a code for positive cases to enter into the Stop Covid App if their original code had expired.

117. In respect of Digital Self Trace (DST) this was not an app as such. It was a web-based portal accessible by a URL link. The third text message sent from "HSCTracing" to a person aged 16 and over with a positive test result included the link and unique identifier code to enter into the DST portal.

Contact Tracing Technology

118. The DTTP programme facilitated the development of a dedicated contact tracing system capable of managing high volumes of cases and contacts. This was contracted to an NI based software company (Kainos) who worked closely with the CTS to develop the system itself, the Digital Self Trace service and the associated analytic platform. The work is described in the DTTP strategy.

119. The contact tracing system was integrated to the Central Test Registry in order to receive all positive results from the (pillar 2) NTI. There was also a write back function to allow positive results to be added to GP records. The systems were robustly tested at each upgrade to ensure that patient confidentiality was maintained throughout. When technical issues arose, these were addressed quickly with the software supplier through agreed processes.

Isolation

120. The legislative position in NI was such that self-isolation, with the exception of some cases of international arrivals who had entered NI via ROI, was guidance only and not mandatory. On that basis, the PHA did not have an enforcing or checking role when identifying index cases and close contacts.

121. Through the work of the CTS, where required, contact tracers would have signposted cases and close contacts to AdviceNI where they could find contemporary guidance in respect of isolation.

Modelling

122. The CTS analytics team developed a suite of complex "real time" operational modelling tools to help break and control onwards transmission:
    - A Cluster Detector and Analyser – This model analysed data in real time looking for patterns in cases, contacts and locations visited to find unknown clusters and drive public health advice & interventions.
    - A Network Analyser – This model analysed real-time data to backwards trace and uncover unknown patterns that could be actioned to reduce ongoing transmission; and
    - A Transmission Change Detector – This real-time model looked for statistically significant changes in growth patterns on defined geographies which could inform, for example, mobile testing unit locations.

123. At weekly Cluster Meetings, Contact Tracing, Health Protection, Surveillance, Health Improvement and Communications staff from the PHA were joined by colleagues from Environmental Health, the Health and Safety Executive as well as Waste Water surveillance teams from QUB to discuss emerging data, results of previous work and horizon scanning.

Public Communication

124. In respect of public communications, the DoH and wider NI Executive led on messaging around government policy in relation to the pandemic. The role of the PHA in this space was to lead on the operational delivery of public health advice raising awareness and providing guidance for the residents of NI.

125. The PHA worked with the NI Executive and the other Devolved Administrations to inform and support the roll out of a range of Covid-19 campaign programmes. PHA communications leads contributed regularly to joint Devolved Administrations communication/marketing meetings to coordinate and discuss messaging and delivery of UK-wide campaigns. The campaigns included UK-wide campaigns led by the Cabinet Office and NI-only campaigns led by the NI Executive.

126. Given the PHA's role in testing and contact tracing, the Agency took the lead in advertising campaigns in relation to TTP, the NI proximity app and DST contact tracing. The PHA worked closely with DHSC digital teams on the proximity apps and DST campaigns. The PHA was also in regular contact with the DoH communications team on campaign plans.

127. Throughout the pandemic, regular press and political briefings from the PHA played an important role in conveying key information to the media, elected representatives, statutory partners and the general public, as well as addressing wider concerns and issues. Regular press conferences were led by the NI Executive Office with the PHA playing a supportive role where required.

128. The Agency also used digital channels (PHA website, Facebook, X (Twitter), Instagram, YouTube and TikTok) to convey messages to target audiences, developing and deploying a range of media approaches including video, graphics, animations and live streams, tailored to subject matter, prevailing priorities and target audiences. All messaging issued by the PHA was NI specific, issues that arose within NI such as around schools, care homes and low uptake groups were approached by developing specific messaging to support the management of these issues. The need to reach a mass and diverse audience quickly meant organic and paid-for campaigns were also developed and produced to extremely tight and demanding deadlines. Social media paid promotions targeting particular areas with location-specific messaging were also utilised.

129. A chronology of communications campaigns is set out below:

Date/Campaign	Communication method	Rationale
Test, Trace, Protect (TTP) programme launch, promotion and engagement. May 2020 - Ongoing	Programme of messaging on TTP disseminated via local news media, PHA and HSC social media channels, online information, newsletters, literature and via partner organisations.	The aim of the programme was to inform the public and make them aware of current Covid-19 symptoms, testing arrangements and any actions they should take.

Test, Trace, Protect July 2020 - September 2020	Mass media advertising campaign. Channels included TV, radio, outdoor, digital and social. Campaign resources and downloads on PHA corporate website for stakeholders.	To provide clear messaging on symptoms, self-isolation if symptomatic and how to participate in TTP and encourage public support for the programme.
Stop COVID NI app July 2020 - October 2020	Mass media advertising. Channels included TV, radio, outdoor, digital and social. Campaign resources and downloads on PHA corporate website for stakeholders. Development of social media assets to explain how the app worked and encourage its use. Consultation and engagement with the community and voluntary sector and human rights organisations.	To raise awareness of and support for Stop Covid NI and contribute to app downloads, in order to help reduce the transmission of Covid-19 in NI.
StopCOVID NI app (young people 11-17) October 2020 - November 2020	Mass media advertising. Channels included TV, radio, outdoor, digital and social. Campaign resources and downloads on PHA corporate website for stakeholders. Development of social media assets to explain how the app worked and encourage its use.	The Stop COVID 19 app was further developed for use by 11-17 year olds and mass media advertising channels used to create awareness and support at a population level.
Living Well community pharmacy campaign October 2020-November 2020	Campaign included briefing information, posters and leaflets featuring information on TTP and the Stop COVID app. Community pharmacy teams engaged with the public on TTP.	Promote and encourage support for TTP. Community pharmacies are a source of health information and advice and also have good reach with the public.
Digital Self Trace December 2020 -January 2021	Public announcement (through media release) of CTS moving to digital first, followed by mass media advertising. Channels included TV, radio, digital and social Banners, posters and printed publications provided to all testing centres. Campaign resources and downloads on PHA corporate website for stakeholders. Organic social media promotion of the service, including the	To promote contact tracing and raise public awareness of the new Health and Social Care digital contact tracing service Digital Self Trace developed to support the manual contact tracing service.

	development of a range of assets explaining and encouraging uptake.	
Variant Enhanced Testing June 2021 - July 2021	In response to surveillance targeted mail drop to households in specific geographical locations to avail of local testing. Engagement with local authorities to support promotion of messaging and consistency.	To help control spread of new variants in identified locations and encourage non-symptomatic residents to avail of pop-up testing in the local area.
Digital Self Trace July 2021 - August 2021	Mass media advertising. Channels included TV, radio, digital and social and support materials Campaign resources and downloads on PHA corporate website for stakeholders. Organic social media promotion of the service, including the development of a range of assets explaining and encouraging uptake.	To promote contact tracing and encourage the public to use the HSC digital contact tracing service.
TTP programme May 2020 - 2022	A range of multi-language posters, publications, easy explainers, flow charts, videos, and online information updated and re-issued as changes happened. Video/TV was signed and subtitled for ISL/BSL for people with hearing difficulties.	Provide the public, partners and stakeholders with up to date information and resources.
TTP programme April 2020 -2022	A range of press releases, feature articles, media briefings, media interviews, social media posts – including videos, graphics and live streams used to promote the TTP programme at each of the key stages of its development. There was an ongoing programme of engagement with local authorities to support promotion of TTP messaging and consistency.	To provide clear messaging on symptoms, self-isolation if symptomatic and how to participate in TTP and encourage public support for the programme. Provide the public, partners and stakeholders with up to date information and resources. To promote contact tracing and encourage the public to use the HSC digital contact tracing service.

130. Omnibus tracking surveys, a method of market research, identified males, younger people and people living in more deprived areas as less likely to comply with TTI requirements (Exhibit PHA-7/19 [INQ000474963]). Printed

material and both video and audio content was developed and disseminated through stakeholders and partner organisations to help increase the reach to these communities.

131. The effectiveness of communication campaigns was monitored through Omnibus tracking surveys and concept testing (Exhibit PHA-7/20 [INQ000474957]) (Exhibit PHA-7/21 [INQ000474958]).

132. Access to an agreed budget for translation services would have been helpful, but this was overcome on an ad-hoc basis as the Agency worked with partner organisations to develop joint content such as videos as the need or opportunity was identified. The fact that much of the messaging did not become relevant to an individual until, for example, they tested positive with Covid-19, meant that messaging had to be regularly pushed out so it was available to those who needed it at the time they needed it, which created a risk of repetition and 'switch-off'. This was addressed by regularly refreshing content as a means to help reduce message fatigue.

Facing a Future Pandemic

133. In June 2020, the then interim Chief Executive commissioned a rapid review of the epidemiological function within the Public Health Department of the PHA which was to have a specific focus on contact tracing. The final report included a description of some of the issues in respect of expectations of the DoH around contact tracing and reporting and the capacity within the Agency at the time to deliver on these. However, there were no recommendations specifically in respect of contact tracing. There were recommendations regarding internal infrastructure that could strengthen the overall response to the pandemic, but they were largely overtaken as the pandemic progressed and the PHA tilted the majority of resources to the pandemic response (Exhibit PHA-7/22 [INQ000474959]).

134. In October 2020, the DoH commissioned a rapid review of the CTS to understand the challenges faced by the Service and facilitate more effective

working. There was no report received as such, but PHA did receive a "diagnostic readout". Several actions were noted, but many of these were already underway in the Service at that point in time, including the establishment of DST, recruitment of analytic and administrative support, the introduction of "push" working, the recruitment of a wider skill mix of tracing staff and the introduction of quality assurance mechanisms (Exhibit PHA-7/23 [INQ000474960]).

135. The Hussey Review included references to contact tracing including the need to maintain a system capable of dealing with large numbers of cases and contacts. (Exhibit PHA-7/24 [INQ000381494]).

Learning and Legacy

136. I believe that there has been learning for the PHA through the experiences of TTI in NI.

137. By way of example:

- As a direct result of the pandemic, the PHA Health Protection Service retained a bank team of contact tracing staff who are now used to augment the wider work of the team when dealing with infectious disease outbreaks.
- Based on the learning from the NI Direct Covid Care telephony service, the PHA has utilised helplines as an efficient way to field queries from individuals on a given issue, most recently in respect of the creation of telephone helpline in relation to cervical screening concerns that arose in NI.
- The development of the Analytics Platform initially as a support to contact tracing has transformed how PHA works in respect of data and analytics. The platform allows the secure ingestion, matching, analysis and display of healthcare data from effectively any source. It can manage this in real time - as in Covid 19 - or in retrospect. Data does not need to leave the platform - all analysis and reporting (dashboards) are built within a secure and protected environment.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed:

Personal Data

Dated: 9 May 2025