Terms of Reference

Second Fleming Fund Country Grant to Nepal (CG2)

1.0 Overview of this grant

These are Terms of Reference (TOR) for the Fleming Fund Second Country Grant for Nepal (CG2) to support surveillance of antimicrobial-resistant bacteria in Nepal. The grant will be funded by the UK Department of Health and Social Care (DHSC), under its Fleming Fund Grants Programme, which is managed by Mott MacDonald, the Management Agent. This Grant for Nepal will focus on sustaining earlier investments made under the First Fleming Fund Country Grant for Nepal (CG1). CG2 will further strengthen surveillance systems for antimicrobial resistance (AMR), antimicrobial use (AMU), and antimicrobial consumption (AMC) in the human, animal health, environment and food safety sectors through a One Health (OH) approach. This grant will align with the national AMR priorities, policy framework and with the investments made by Government of Nepal (GoN), other donors and stakeholders in this area.

The Grantee (or Lead Grantee, if a consortium) will be responsible to Mott MacDonald for all aspects of the grant including the management of any sub-grantees in the consortium, their performance, technical delivery and financial accountability. The Grantee will be expected to sign the Grant Agreement with Mott MacDonald and will be expected to enter sub-granting arrangements with partners on the same back-to-back terms.

The Grantee will need to work in close coordination with the GoN's Antimicrobial Resistance Containment Steering Committee (AMRCSC), as well as Mott MacDonald and other stakeholders, as needed. The Grantee will also be required to harmonise efforts on CG2 with other types of grants under Fleming Fund, namely Regional Grants and the Fleming Fellowship Scheme. In addition to this, the CG2 will work closely with another Fleming Fund Second Country Grant (the Policy Grant), which will be implemented along with the CG2 (more details in the following sections).

This grant is expected to last 14 months. Grant applications should be in the region of £2.5-2.75 million, including all capital, procurement, recurrent costs, and overheads and management costs.

2.0 Overview of the Fleming Fund

2.1.1 Introduction

The UK Government has established the Fleming Fund to respond to the global threat of drug-resistant infections due to bacterial Antimicrobial Resistance. The Fleming Fund will be a critical tool in achieving the resolution of the 68th World Health Assembly, 2015 (WHA A68/20), and in realising the 'Political Declaration of the High-Level Meeting of the United Nations General Assembly (UNGA) on Antimicrobial Resistance, 2016'. The resolution and declaration recognise that urgent cross-sectoral rationalisation of antimicrobial use, prevention and control of infections in humans, animals, food, agriculture, and aquaculture sectors, are key to tackling AMR. These commitments call for: innovative research and development; affordable and accessible antimicrobial medicines and vaccines; improved surveillance and

monitoring; increased governance on antimicrobial use; and increased international cooperation to control and prevent AMR.

The Fleming Fund aims to address critical gaps in surveillance of antimicrobial-resistant bacteria in low- and middle-income countries (LMICs) in Asia and Sub-Saharan Africa. Countries in these areas are set to bear the highest burden of drug resistant infections. A Global Action Plan on Antimicrobial Resistance (GAP-AMR) has been developed by the World Health Organization (WHO), which acts as the blueprint for a multi-stakeholder global response to averting a global health crisis caused by AMR.[1]

The Fleming Fund comprises several workstreams (see www.flemingfund.org for more information). Reinforcing the One Health approach, one workstream provides support to the Tripartite Alliance between the Food and Agriculture Organization (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO). Through funding to the Tripartite Alliance, the Fleming Fund has contributed to development of National Action Plans (NAPs) in Sub-Saharan Africa, South and South East Asia, thereby supporting in building evidence base and guidance for AMR surveillance. This component targets identifying capacity gaps in NAPs and is critical for overall success of the Fleming Fund Grants Programme.

The Fleming Fund Grant Programme aims to improve the ability of recipient countries to diagnose drug-resistant infections, with an emphasis on bacterial infections, and to improve data and surveillance to inform policy and practice at national and international levels and is the largest financial stream available through the overarching Fleming Fund. The Fund also supports initiatives in academic institutions to develop guidance on the development of AMR surveillance systems.

Mott MacDonald, the MA for the grants, is a global company with expertise in multi-sectoral international development and fund management.

The geographic focus of the Fleming Fund Grants Programme is 20-24 LMICs from Sub-Saharan Africa, and South and South East Asia, including Indonesia. It can provide financial support up to 2021 to participating countries via three funding channels:

- Country Grants
- Fleming Fellowship Scheme Grants
- Regional Grants

The Fleming Fund will be independently evaluated by Itad, a specialist evaluation firm appointed by the DHSC.

2.1.2 Problem statement to be addressed by the Fleming Fund

The issues to be addressed by FFCG are outlined below (please note these are general issues in LMICs about AMR, and may not all be relevant in the case of Nepal):

- Few trained microbiologists to undertake the volume of testing required for representative surveillance on AMR
- Few health facilities that routinely undertake bacterial culture; still fewer facilities that meet the requirements for accreditation, or who do routine Antimicrobial Susceptibility Testing.
- Absence of surveillance for AMR in healthcare delivery and barriers to developing it

[1] http://www.who.int/antimicrobial-resistance/global-action-plan/en/

- Little perceived use of surveillance data at different levels and low demand for the data from policy makers
- Lack of knowledge on the use and consumption of antimicrobial agents across One Health sectors
- Lack of antimicrobial stewardship
- Logistical challenges i.e. safe and secured transportation of samples under challenged logistical contexts
- Quality and sustainable supply chain for reagents and consumables; appropriate servicing of equipment
- Vertical surveillance systems (national, regional and global) that are not linked/ unwilling to integrate.
- Weak OH structures and poor inter-sectoral collaboration
- Heterogeneous starting points, political will, capability, and donor interest and engagement across regions and countries
- Poorly defined and applied quality assurance standards in laboratory testing
- Lack of understanding across all sectors on transmission patterns and drivers such as inappropriate use of antimicrobial drugs

2.1.3 Fleming Fund investment areas and outputs

To address the problems above, the FFGP invests in:

- Laboratory infrastructure enhancement;
- Human resource strengthening and workforce reforms;
- Surveillance systems strengthening;
- Building foundations for AMR surveillance data use; and
- Promoting rational use of antimicrobial medicines.

Investment in these areas is expected to achieve the following outputs:

- Improved laboratory skills for bacterial identification and Antimicrobial Susceptibility Testing (AST); and, therefore, improved data quality;
- A strengthened OH workforce with a range of relevant skills for AMR surveillance;
- Stronger AMR surveillance systems and processes at country and regional levels;
- Higher demand for AMR data at regional, country, subnational and facility levels; and
- Better knowledge of country level patterns of prescribing practice and use of antimicrobials (particularly for bacterial infection) across sectors.

Fleming Fund outputs are expected to contribute to the following country outputs:

- Increase in quality and quantity of AMR and AMU data collected;
- AMR and AMU data shared in country to support evidence-based policy and practice; and
- AMR and AMU data shared internationally to improve and inform the global response, via the WHO Global Antimicrobial Resistance Surveillance System (GLASS) programme for human health AMR data.

The ToRs for the second Country Grant has been designed to ensure that investments and activities contribute directly to outputs. Grantee is expected to adhere to and demonstrate this alignment and contribution to outputs in their applications.

2.1.4 Core principles within the Fleming Fund Grants Programme

The Fleming Fund is built on four core principles. Grantees are expected to demonstrate how they will align with these principles in the application and during implementation.

1.3.1 **Country Ownership:** The Fleming Fund Grants Programme will work closely with GoN to ensure that activities undertaken through this grant are in line with Nepal's NAP on AMR. The Grantee is expected to plan and implement activities in close consultation with GoN, keeping country priorities and needs in mind, but within limits of the scope as mentioned in this TOR. Unless there are good reasons not to do so, Fleming Fund grants will chiefly invest in the public sector to support development of national public health systems.

1.3.2 **One Health:** The Fleming Fund recognises that the problem of AMR is a great danger to human health and cannot be controlled without a OH approach. A specific set of OH investment parameters has also been developed and are summarised below. This approach is aligned with key documents and guidelines from OIE[2] and FAO[3] as well as the Global Action Plan.

a. ***Collaborative multi-sectoral governance of AMR*:** Leadership and resourcing of AMR surveillance and mitigation measures in all sectors that contribute to the emergence of AMR.

b. ***Integrated AMR and antimicrobial use and consumption surveillance in all sectors*:** Surveillance in humans, livestock, aquaculture, crops, food and the environment to produce information that is interpreted by multi-sectoral teams to help understand factors associated with AMR emergence within and between sectors.

c. ***AMR mitigation policies and programmes prioritised across multiple sectors*:** Evidence-based policies and programmes for AMR mitigation measures that are prioritised across the relevant sectors, based on information generated through AMR, AMU and AMC surveillance in all sectors.

1.3.3 **Alignment of Approach:** The Fleming Fund Grants Programme will seek to invest in areas which complement and build on work done to date, rather than create new systems. Grant applicants will need to demonstrate that they understand GoN investments and other actors' work in the field of improved laboratory capacity (both within and outside the sphere of AMR surveillance), improved disease surveillance, and the One Health approach. The Fleming Fund Grants Programme will assess grants for duplication of efforts and/or the development of parallel systems. To the extent possible, applicants will need to demonstrate how their proposals add value to existing and planned investments and systems.

1.3.4 **Sustainability:** The Fleming Fund Grants Programme will focus assistance on national systems with a view to long-term sustainability. Investment size and scope should, as far as possible, be aligned with national government spending so that systems created with Fleming Fund grants are sustainable within the public health system. We also recognise that the public good of conducting AMR surveillance means medium- to long-term support, and it is expected that countries that demonstrate good performance will have access to additional funds to provide ongoing support. Applicants should explain how they will undertake actions to achieve sustainability on a long-term basis.

2.1.5 Fleming Fund Investments to date in Nepal and future

In Nepal, the first Fleming Fund Country Grant (CG1) is being implemented by the FHI 360 since August 2018 for a 26-month period. The end date of the grant is 30th September 2020. This will be followed by the CG2. Both these grants focus on building a strong One Health (OH) approach to AMR surveillance, by bringing

[2] OIE Standards, Guideline and Resolution on Antimicrobial resistance and the use of antimicrobial agents;

[3] The FAO Action Plan on Antimicrobial Resistance, 2016-2020.

together multi-sectoral stakeholders to share surveillance data and to gain a better understanding of AMR and AMU. The objectives of the CG1 were:

- Establishing a functional One Health AMR/AMU Surveillance Technical Working Group (TWG) to support the AMRCSC
- Strengthening AMR/AMU surveillance in humans
- Strengthening AMR /AMU surveillance in animals

These objectives were supported by 22 outputs largely centred around surveillance and data sharing on AMR/AMU for both animal and human health. These outputs included having a functional TWG as per AMRCSC approved TORs, setting up reference laboratories both in HH and AH, renovation of laboratories at the surveillance sites, regular expedition of AMR/U data to the One Health AMR/AMU surveillance TWG.

In addition, the Fleming Fellowship Scheme was initiated in February 2019 in Nepal. The first round of professional fellowships which included six fellowships (three in human health and three in animal health domain) is being implemented through The Doherty Institute and University of Melbourne (the host institution). The FF is in discussions with GoN to finalise second round of professional fellowships (maximum four fellowships) and policy fellowships for Nepal, which most likely be rolled out by end of 2020.

Fleming Fund will also be rolling out another Country Grant (the Policy Grant) for Nepal, which will run parallelly to this grant. It is expected to start by the end of 2020, with WHO as the (lead) grantee, this grant will focus on developing evidence based solutions, plans and governance mechanisms for AMR surveillance, strengthening human capacity at surveillance sites and active support to the government for coordinating national efforts on AMR.

The Regional Grants running in parallel to the above grants aim at collecting historical AMR data and boost the impact of the Country & Fellowship Grants through regional initiatives. Regional grants have been developed with specific focus on improving data protocols, strengthening political AMR advocacy and improving regional AMR training and networks. There have been two rounds of regional grants. The first of the two grants on Capturing Data on Antimicrobial Resistance (AMR) Patterns and Trends in Use in Regions of Asia (CAPTURA) is being implemented by the International Vaccine Institute (IVI). The second regional grant focussing on increasing the availability of high-quality data on the spread of antimicrobial resistance is implemented Technical University of Denmark (DTU), with IVI as the consortium partner. Third is being implemented by Endemic Pandemic, which is focusing in improving quality of laboratory bacteriology diagnostics, and the fourth one is focusing on policy and advocacy on AMR and is being implemented by IVI.

2.1.6 Progress of CG1 and Current AMR Situation and Needs in Nepal[4]

2.1.7 Strategic/Policy level AMR related issues

Nepal's national AMR landscape is well developed. There is a working NAP, a national AMR policy is in draft, and there is also a draft second version of AMR National Antimicrobial Resistance Containment Action Plan which is currently being reviewed at the Cabinet level. The latter outlines a plan to expand the existing surveillance system, but it has not yet been translated into a detailed budgeted implementation plan. Further, there is a clear governance structure, which has been supported by the Fleming Fund country grant. The AMRCSC is chaired by the Secretary, Ministry of Health and Population (MOHP). The four technical working groups, positioned below the AMRCSC are: National Technical Working Committee

[4] As per findings from the Scoping Mission undertaken in Early 2020, and some of the situation might have changed since then.

(NTWC) chaired by the Chief, Quality Standard and Regulation Division, MOHP; a Human Health Technical Working Group chaired by the Director, National Public Health Laboratory; an Animal Health-High level Coordination Committee chaired by the Director General, Department of Livestock Services (DLS) and an Animal Health Technical Working Group chaired by the Chief, Central Veterinary Laboratory (DHL). These TWGs are logistically supported by the fund and meet regularly. TWGs are a statutory part of the GoN landscape are likely to continue in the future.

However, there are some gaps in the governance system that need to be addressed i.e. NTWC capacities further need to be strengthened so that they can propose evidence-based policy changes, based on data gathered through the surveillance system. Furthermore, there is a need to sensitise policy makers across government ministries and departments beyond health on AMR. There is an expressed need of a capacitated core team of cross sectoral high-level stakeholders, to drive the national agenda on AMR.

Other areas that need further strengthening include (1) coordination among different (2) platforms and governance mechanisms, with active involvement of academia that support in framing regulations, laws and direction for policy o. These gaps will be addressed AMR and related topics.

2.1.8 Human Health Laboratory Capacity

Currently, eight human health laboratories (see annex 1) are being supported by CG1. These laboratories have been strengthened though training sessions and provision of equipment and consumables. The supported has resulted in an increase in the number of pathogens identified and in the amount of data being reported to the NPHL.

While CG1 focused on improvement of laboratory capacity to provide quality microbiology services to patients and clinicians and to improve AMR data collection and reporting, there is a need to involve clinicians and hospital management to use generated data locally. Laboratories do not function 24/7, in all hospitals, there is thus a reduced likelihood of clinicians sampling patients before treating them. To encourage clinicians to sample patients at any time of the day, some hospital microbiology laboratories provide incubators and refrigerators to the emergency laboratory so that the sample intended for microbiology can start to be processed immediately. The focus of CG1 was to improve the technical capacity of the laboratories to meet minimum standards for reliable diagnosis of the priority GLASS pathogens. Now that the laboratories are showing progress, the next step is to engage clinicians, improve use of the laboratories and ensure that data from the laboratories is being used locally for patient management and to inform stewardship / infection control programmes.

The laboratories still vary widely in their capacities owing to the availability of human resources (which are rather unavailable). It is therefore proposed to address the policy level or strategic level issues including availability of human resource, supply chain and equipment maintenance etc in the CG2. In addition, it is proposed to support additional seven laboratories, of which four have been assessed using the Mott Macdonald tool under CG1. Grantee is expected to undertake assessment of three labs as indicated below and develop detailed scopes of work/support for these labs in close coordination with MOHP/AMRCS. The approval would be sought from MM on the detailed work/support plan for the three labs by the end of first quarter of the CG2. (see names of the labs in annex 1)

2.1.9 Animal Health laboratory capacity

Under CG1, Central Veterinary Laboratory (CVL) and 3 provincial laboratories are being supported to develop microbiological capacity to identify *E. coli*, *Salmonella, Enterococci* and *Campylobacter* (at national reference laboratory for AH- CVL only). For the four laboratories, the proficiency testing and External

Quality Assurance System (EQAS) have been initiated. However, results are not yet adequate. There is a need to strengthen their current microbiology capacity, update Standard Operating Procedures (SOPs) that address sample handling, data management and flow, and microbiology testing. There are no veterinary microbiologists in Nepal, only veterinarians who have received some additional training in bacteriology/microbiology. However, there is little demand for such services in clinical practices so it would be difficult to sustain a high number of veterinary microbiologists. There are only three provincial laboratories not currently supported under CG1, two of which reportedly have the same capacity as the ones currently supported, the third one may need more substantial support. Considering this, CG2 will include site assessments for these 3 laboratories, and subsequent support. In order to keep to the principle of sustainability, the fund would not support the laboratories in purchase of consumables, as they are not part of active surveillance. The grant would support laboratories for equipment and renovation (if necessary).

2.1.10 GLASS reporting

As more surveillance site laboratories generated and reported data to National Coordination Centre (NCC), There has been a significant increase of data reported by NCC. The data reporting however is currently not in the standardized formats. Various hospital and laboratory information systems are being used across the country and a few sites still generate hard copy reports. Data management systems being used at surveillance sites need to be mapped out to identify and implement a harmonising process for the formats in which data is submitted to the NCC.

2.1.11 AMU Surveillance

A survey to collect AMU data was developed in CG1 and this survey was to be conducted as a pilot at one hospital. However, this could not be carried due to restrictions on hospital-based activities due to COVID 19. A detailed protocol based on the WHO/Global Point Prevalence Survey of Antimicrobial Consumption (PPS) is to be developed and Point Prevalence Survey (PPS) on AMU is being conducted at one hospital during CG1. This is being conducted as a pilot with lessons learnt to be used to expand AMU surveillance to other hospitals in subsequent grant(s). Further point prevalence studies based on the findings of the pilot are to be conducted at five hospitals (to be identified in conjunction with GoN) so that AMU surveillance data can be generated. This AMU data should be shared both locally to advise hospital administrators, antimicrobial stewardship units and Infection prevention and control (Committee), and with nationally relevant stakeholders (TWGs, and Directorate of Drug Administration etc).

Under CG1, a protocol for active AMR surveillance in poultry (both layers and broilers) was developed and the survey will be carried out in 2020, in the four regions where supported laboratories are located. Surveillance in chickens will be aligned with surveillance in humans carried out in similar geographic areas, targeting similar bacterial species and resistance patterns to allow comparison of resistance phenotypes between sectors. This round of surveillance plan did not target pathogens of interest to veterinary medicine. However, it is noted that veterinarians and farmers regularly face treatment failure of mastitis and dairy production, this has led to rising demand for proper diagnostics. As this need emerges, there is interest in collecting data on AMR in dairy cattle.

The CG2 must extend the survey for AMR surveillance in poultry to larger geographical area, particularly in AMR surveillance sites to obtain AMU/AMC data from end users/farms. The quantitative data obtained on AMU/C from the study can be used to source track AMR patterns obtained in the laboratory.

2.1.12 OIE reporting

Under CG1 Nepal has shifted from reporting qualitative data to the OIE to reporting using Option 1 of OIE reporting options. Import and control of veterinary drugs are currently under DDA's responsibility. Supporting DDA to improve its ability to monitor import, manufacturing and sale of drugs (as explained above) is expected to improve Nepal's capacity to report AMU data to OIE.

2.1.13 Environment and food safety sector

The Department of Environment, under Ministry of Forests and Environment, currently has only one microbiologist. The microbiology laboratory was being set up at the time of the Scoping visit for CG2. In the absence of a strategy for surveillance of AMR in the environment and protocols to implement in the environmental sector, CG2 may support the environment sector to design their surveillance strategy and protocols for AMR surveillance on liquid and solid waste management (including water inflow and outflow) at hospitals.

There are concerns from donors/implementing partners and GoN on health waste management in the health sector additionally the area of intervention has had a good buy-in from the Department of Environment. In the absence of a strategy for surveillance of AMR in the environment and protocols to implement in the environmental sector, CG2 may support the environment sector to design their surveillance strategy and protocols for AMR surveillance on liquid and solid waste management (including water inflow and outflow) at hospitals.

Given the extremely nascent stage of AMR surveillance and environmental efforts and the restricted timeframe of the grant, and since WHO will implement Tricycle in Nepal in 2020, CG2 shall merely support the development of a strategy for AMR surveillance in the environment and not aim at strengthening capacities at environmental laboratories. CG2 may collaborate with Tricycle Project, if appropriate, after due discussion with WHO, once CG2 is initiated.

AMR surveillance conducted by Department of Food Technology and Quality Control (DFTQC), under Ministry of Agriculture and Livestock development, has been added to the revised NAP. As a result, GoN is keen to see AMR surveillance in food included in CG2. DFTQC is responsible for food quality and certification of processed food. Control of non-processed food such as fresh, unpackaged meat and milk sold by mobile vendors or butchers was under the responsibility of the veterinary public health laboratory, this however with federalisation though this was discontinued. Currently these products seem to be under the ambit of CVL's responsibility, however these jurisdictions are far from being systematic.

On the other hand, DFTQC, under its current monitoring system, regularly receives samples of processed food sent by officers from around the country. However, the sampling frame and sampling strategy do not seem to be designed to enable calculations of prevalence or integration with findings from wider AMR surveillance strategy. For the moment, the aim behind inclusion of AMR surveillance in food seems to be to include DFTQC in the national AMR surveillance activities. According to initial findings and once the laboratory is up to speed with antimicrobial susceptibility testing (ASTs), further consideration could be given to the overall strategy and objective of carrying out AMR surveillance in food products. As the samples are taken from food, i.e. with having maximum risk of contamination, they are regularly found positive and the laboratory is reasonably well equipped and staffed. They have never carried out AST and would need training to acquire this capacity. As for the moment the objective of AMR surveillance in food products has

not been clearly identified by the government, it could be useful to provide technical assistance to understand how to use and interpret results from AMR surveillance in food.

2.2.1 Grant Duration, Funds, Objectives and Outputs

2.2.2 Duration and phasing of the grant

The grant is expected to start October 2020 and will last for approximately 14 months.

2.2.3 Grant Objectives and Outputs

Objective 1: Strengthen One Health AMR/AMU Surveillance Technical Working Group to support the AMRCSC

Output 1.1: An AMR secretariat functioning in accordance with an approved Terms of Reference (TOR)

Nepal has recorded considerable progress in strengthening AMR surveillance in human and animal health sectors which has resulted in increased data that is being discussed at the national level and shared with GLASS. CG2 grantee will continue to provide administrative and technical assistance to AMR Secretariat, and will assist in quarterly and annual reports showing a comparison of the AMR and AMU patterns in humans and animals are sent to the AMRCSC. CG2 will provide support to AMRCSC to meet regularly and ensure that it has representation from other sectors/ministries, and functions effectively.

Output 1.2: **One Health AMR/AMU Surveillance Technical Working Group are functioning as per the TOR**

Grantee will ensure that NTWC and other TWGs meet at least twice a year to discuss AMR, AMU and AMC surveillance design, data, strategies results, etc. Sector-specific results of AMR and AMU surveillance are shared by sector-specific TWGs, during discussions held at multisectoral TWG meetings. These discussions and reviews lead to recommendations that are submitted to AMRCSC to influence policy decisions.

A multi-sectoral national AMR and AMU symposium will be held towards the end of the grant (all sector-specific results and recommendations from AMR and AMU surveillance programmes will be presented at the end of the grant period to highlight the importance of the OH approach in tackling AMR).

Objective 2: **Sustain existing support to AMR and AMU surveillance and expand to additional sites (HH).**

Output 2.1: Sustain and develop support to human health laboratories (AMR surveillance)

Eight human health laboratories are presently being supported under CG1. Capacity of these laboratories to conduct bacterial identification and ASTs has strengthened though training sessions and provision of equipment and consumables. The laboratories still vary widely in their capacity because of the Human resources available. A functional assessment of the laboratories including the quality of samples received, sample rejection criteria, SOPs, biosafety and biosecurity measures in place etc is to be carried out. Gaps identified will be addressed.
In addition, it is proposed to support a further seven laboratories, of which the needs of 4 laboratories have been assessed, using the MM tool, under CG1. CG2 will undertake assessment of 3 remaining within first quarter of the CG2.

Data management systems being used at surveillance sites need to be mapped out to identify, and implement, a means of harmonising the format in which data is submitted to the NCC.

By the end of the grant the following will be achieved:

- Procurement list and renovation plans have been conducted and implemented in the seven additional laboratories assessed during CG1, and to be added under CG2.
- All Fleming Fund supported sites have undergone the necessary renovations, have been equipped and consumables have been provided (as per the findings of the assessment) to enable them to function as AMR surveillance sites.
- Low performing laboratories have been identified. These laboratories have been provided with continuous supportive supervision to monitor and reduce contamination rates (especially of blood cultures), and on-site bench training of staff to promote good microbiological practices.
- All the Fleming Fund supported sites have active quality management programmes.
- All sites in the surveillance system send data in a uniform format to NCC for compilation and analysis.

Output 2.2: Ensure interoperability of AMR surveillance into National surveillance systems.

Stakeholders have informed us that there is many hospital and laboratory information systems being used across the country. In addition, in the past, "disease programmes" have created their own surveillance systems, resulting in over 50 different surveillance systems which are not coordinated. GiZ is currently running a programme, in collaboration with Epidemiology and Disease Control Division (EDCD), to harmonise surveillance and health information systems. They have created a platform used by four hospitals and are strengthening District Health Information Software (DHIS2) so that Laboratory Information Management Solution (LIM) and Hospital Information Management System (HIMS) can be connected to it, thus increasing EDCD's ability to use the data generated in over 100 surveillance sites. This project is due to finish within the 2020-21 but has been extended for several years. However, the system needs to be promoted, software and hardware are insufficient and staff's capacity to manage and analyse data needs to be strengthened.

Federalisation has created challenges in data reporting as EDCD does not have the mandate to collect data from provinces. WHO is currently providing support to disentangle issues created by federalisation? However, it is expected to be a lengthy process.
We expect the grantee to ensure that the AMR surveillance system that is being put in place does not create yet again an independent, parallel, surveillance system. The AMR surveillance system should be integrated, as much as possible, into current information systems.
The grantee is expected to collaborate with EDCD to ensure they are capacitated to receive, manage and analyse data generated through AMR surveillance considering results from other surveillance data analysis. Opportunities to enhance EDCD's current disease surveillance system to include AMR results should be explored.

By the end of the grant the following will be achieved:

- Efforts taken towards integrating AMR surveillance system into the current surveillance system
- Owing to consultations with GiZ and EDCD, means of integrating AMR surveillance data into a common platform have been explored and implemented, as relevant.

Output 2.3: Promote the national use of data (e.g. policy recommendations, therapeutic guidelines)
There is a need for results generated by the AMR surveillance system to be used nationally. EDCD has the technical capacity to analyse the data and present the results to AMRCC and other policy makers. Though as things stand, the mandate for data analysis lies with NPHL as the NCC but they do not have enough capacity to undertake this. EDCD currently produces quarterly epidemiological bulletins and therapeutic guidelines for physicians.

To promote the use of AMR surveillance data, and better integration into national systems, we expect the following to be undertaken:

- EDCD and NCC have clear ToRs for the collection, use and sharing of AMR data, as described under objective 1
- AMR surveillance findings are used to develop guidelines for pharmacists and physicians, which, depending on findings, may need to be tailored to sites / regions.
- AMR surveillance data is analysed, and results presented in regular epidemiology bulletins, interpreted alongside findings from AMU and AMC studies as well as with data generated from other Animal Health and Food sectors.
- AMR surveillance findings have been used to produce policy recommendations that consider findings and needs of all sectors engaged in AMR surveillance, and that are presented to the AMRCC.

Output 2.4: Increase engagement of Clinicians and Hospital administrators in AMR surveillance and increased data use locally at surveillance sites

Clinicians are also the focus of interventions aimed at improving antimicrobial stewardship and it is therefore vital to include them in any AMR programme. Laboratories will need to report results in a timely manner in order to inform patient care, and clinical staff should also be responding to culture results appropriately. Use of the clinical microbiology laboratories should be integrated into standard good clinical care of patients: as guidance, patients being treated for sepsis (i.e. receiving intravenous antimicrobials) should have at least one set of blood cultures taken, plus additional samples as per presenting syndrome, and specimen forms should have basic data regarding clinical presentation and antimicrobial treatment.

By the end of the grant we expect that the following will have been achieved:

- Increased number of good quality blood culture samples sent to the laboratory, with acceptable contamination rates and relevant clinical data recorded on the request form.
- Results are communicated to clinicians in a timely manner, and systems are in place to communicate critical results (e.g. CSF samples, positive blood cultures) without delay
- Clinicians and pharmacists at the surveillance sites demonstrate an improved understanding of how to incorporate bacteriology results into their practice.
- Appropriate samples for microbiological examination are collected at any time of the day, at all surveillance sites.
- Data generated at the site is analysed locally and being used to inform hospital level decisions on training, stewardship and drug policies. This may be via Medicines and Therapeutic Committees, Antimicrobial Stewardship Committees or similar entities.

Output 2.5: Support implementation of regular, sustained PPS on AMU in hospitals
A survey to collect AMU data was developed in CG1 and this survey was to be conducted as a pilot at one hospital. However, this could not be carried due to restrictions on hospital-based activities due to COVID 19. A detailed protocol based on the WHO /Global Point Prevalence Survey (PPS), to be developed and implemented at one site as a pilot. Further point prevalence studies based on the findings of the pilot are to be conducted at five hospitals (to be identified in conjunction with GoN) so that AMU surveillance data can be generated. The surveys at the hospitals should be planned with the use of local enumerators to develop capacity at the hospitals to undertake these studies at regular intervals and to maintain patient confidentiality as per local hospital guidelines

By the end of the grant the following would be achieved:

- Implementation of a regular programme of point prevalence surveys (e.g. using the Global PPS or the WHO PPS methodology). Site staff should be trained in the methodology and sites should be capable of undertaking the survey on an annual basis.
- The information from these PPS should be shared locally with Hospital administrators, Antimicrobial stewardship committees, and Infection Prevention and Control committees

- The information should also be shared nationally with NCC, Human Health TWG and NATC to try to ascertain trends and association of antimicrobial use with antimicrobial resistance

<u>Objective 3</u>: Sustain existing support to AMR and AMU surveillance, and expand to additional sites (AH).

Output 3.1: Sustain and develop support to animal health laboratories (AMR surveillance)

Under CG1, CVL and three provincial laboratories are being supported to identify *E. coli*, *Salmonella, Enterococci* and *Campylobacter* (CVL only). Proficiency testing and EQAS have been initiated. However, results are not yet adequate. There is a need to strengthen their current microbiology capacity, update SOPs that address sample handling, data management and flow, microbiology testing, etc. There are no veterinary microbiologists in Nepal, only veterinarians who have received some additional training in bacteriology/microbiology. However, there is little demand for such services in clinical practices so it would be difficult to sustain a high number of veterinary microbiologists for now.

There are seven provincial animal health laboratories in Nepal, four of them were supported under CG1 and among remaining three sites, two are said to have at least the same capacity as the ones currently supported and the third one may need more substantial support going forward in CG2.

By the end of the grant we expect the following to have been achieved:

- At laboratories supported under CG1:
    - Expand the number of pathogens the laboratories can identify. to a limited number of pathogens among the most frequently identified in clinical practice. The specific pathogens will be agreed upon once further data has been provided by the grantee, in collaboration with CVL, on the frequency of pathogens identified.

- In the 3 new laboratories to be supported:
    - The laboratories refurbished and equipped, so that they meet minimum OIE standards and microbiology testing can be performed to adequate quality, maintaining proper biosafety and security standards.
    - Staff receive adequate training sessions to enable them to culture, isolate, and identify pathogens to an acceptable standard as demonstrated by EQAS and PT results, *E. coli* and *Salmonella spp,* and perform ASTs by using disc diffusion.

- In all laboratories:
    - Standardize SOPs used in the laboratories for bacteriology (sample handling, bacterial identification, AST, data management, reporting to farmers/veterinarians/management/CVL, etc) to ensure they are complete, effective, and meet current international standards.
    - Ensure all laboratories are processing samples and generating quality data performing well at PT and are enrolled in EQAS for the bacterial species prioritised for CG1 and CG2.
    - Provide bench microbiology mentoring to animal health laboratories by a veterinary microbiologist or a microbiologist for several weeks a year.
    - Develop a LIMS or work with the existing data management system to link all laboratories included in the surveillance system. All staff are trained in using the LIMS and it is being used.

Output 3.2: Sustain and develop support to enhance AMR surveillance data use

As mentioned in section 2.6.5 a protocol for active AMR surveillance in poultry was developed for broilers and in the 4 regions however the surveillance could not be implemented due to COVID related travel restrictions. Although surveillance in humans and chickens was carried out in similar geographic areas, targeted similar bacterial species and resistance patterns (according to phenotype), the findings cannot provide insights into sources of resistance genes or associations between observed phenotypic AMR patterns in isolates of the same species.

The round of surveillance did not target testing for AMR in pathogens of interest to veterinary medicine. There is an increased interest to collect data on AMR in pathogens affecting dairy cattle.

By the end of the grant we expect the following to have been achieved:

- Active AMR surveillance in poultry has been conducted in selected surveillance sites and data will have been generated and shared with all the stakeholders including TWG and AMRCSC
- A protocol for active AMR surveillance in dairy cattle has been designed, focusing on zoonotic pathogens, where possible, and mastitis pathogens. This will be provided to the grantee and AH AMR TWG. Synergies with AMR surveillance in food such as pasteurised milk, conducted by DFTQC, could also be considered. The protocol should be implemented from data collection to data analysis and interpretation, findings are to be presented to the AH TWG, and the multisectoral TWG for discussions on actions to be taken.

Output 3.3: To support a farm-based survey to understand AMU
A farm-based AMU survey has been carried out in the Kathmandu valley as part of CG1. Findings from this study will guide next step towards Farm based AMU survey in CG2.

By the end of the grant we expect the following to have been achieved:

- A longitudinal survey/study, representative of the population, has been conducted with the objectives to understand antimicrobial use, prescription and sales practices of farmers, veterinarians and veterinary drug vendors.
- Findings of the survey are discussed at the AH TWG, and to the OH TWG, to produce conclusions that will be presented as policy recommendations to policy makers and will be aligned across sectors as appropriate and necessary.

<u>Objective 4</u>: Support DDA AMC surveillance in human and veterinary drugs

Output 4.1: Support the development of a system that can monitor imports, manufacturing and sales of all (human and veterinary) drugs and support AMC surveillance being initiated at the DDA.

Although DDA is responsible for imports and control of veterinary and human drugs it is unable to provide reliable data on imports, manufacturing or sales of any drugs. In order to report AMC data to OIE, Ministry of Agriculture and Livestock Development (MoLD) must work in close collaboration with DDA and DDA has a position, yet to be filled, for a veterinarian.

DDA has conducted, with assistance from WHO, a study using WHO methodology on AMC and data collection templates shared by WHO HQ. The data was to be collected from the valley & beyond, with the support from 4-5 DDA officers assigned to the study to facilitate data collection from industrials.

DDA is currently upgrading its Post Market Surveillance (PMS) software with support from WHO. The upgraded version of the software should enable DDA to undertake regular AMC data collection. Furthermore, manufacturers and importers will be enabled to use this platform for quantification. Hence, IT consultants were hired to modify and include functionalities for antimicrobials, narcotics and medical abortion drugs consumption data collection from manufacturers and importers. However, full scale implementation is expected to take a long time and WHO has been requested to continue the support to DDA for data collection.

Given the amplitude of the changes and support needed, the grantee should align with WHO and DDA to strengthen DDA's capacity to monitor AMC, drug imports and sales, and use data to inform policy.
This should include purchasing of computers, software, server, IT training, etc. as required. These activities also need to be conducted in collaboration with MoLD so that their needs in terms of AMC surveillance of

veterinary drugs are met. By the end of the grant, GoN should be able to know the quantities of drugs sold, per drug type.

As far as reporting data to OIE is concerned, Nepal has been able to progress from the qualitative option for reporting to option 1. The grantee should provide support to improve the quality of data reported, and, if possible, help progress towards reporting option 2. However, this will depend on inter-sectoral cooperation and progress in software and hardware installation and training at DDA.

By the end of the grant the following would have been achieved:

- Software and hardware are in place, that enable DDA to monitor drug imports, manufacturing and sales, at least to the wholesale level, as requested by DG DDA
- A database to track import, manufacture and distribution of antimicrobials is established at the DDA.
- Reliable yearly reports can be produced on AMC in human and veterinary drugs.
- There is a good understanding of distribution pathways of human and veterinary drugs: names of importers, manufacturers, wholesalers and approximate volumes of drugs traded.
- Quality of data reported to OIE (Option 1) has improved
- Distribution pathways are used to inform a risk-based surveillance system for drug quality control.

Objective 5: Expand AMR surveillance to Food Safety and Environment

Output 5.1: Enhancing AMR Surveillance Capacities of Department of Food Technology and Quality Control
As discussed in section 2.6.7, Currently, the objective of AMR surveillance in food products has not been clearly identified by the government, although AMR surveillance in food will be part of the new NAP, it would be useful to provide TA to understand how to use and interpret results from AMR surveillance in food.

By the end of the grant we expect the following to have been achieved:

- SOPs for sampling processing, bacterial identification, and data management have been reviewed and updated to ensure they align with international standards and they are used routinely by staff.
- DFTQC has been capacitated to undertake ASTs, SOPs are in place, aligned with international standards and are routinely used by staff.
- There is a software, and adequate hardware, in place to store AMR surveillance data, including back-ups.
- An inventoried biorepository in which all isolates are stored is installed either at DFTQC or at a partner laboratory (example: CVL) with which a formal agreement and ToRs for access and use are put into place
- A laboratory is identified to provide QA to DFQC and the DFTQC is enrolled in an EQAS and proficiently tests
- A reference laboratory to which DFTQC can send a proportion of its isolates for confirmatory testing and advanced testing should be identified, formal agreements and ToRs agreed upon. Since a major aim of AMR surveillance in food is to identify the possible transmission of resistance from animals to humans via the food chain it would seem preferable to strengthen collaboration between CVL and DFTQC, with oversight from the OH TWG where findings and activities in all sectors are to be discussed.
- DFTQC staff can enter, manage, analyse and interpret data. Data is regularly backed up. If data analysis and interpretation cannot be carried out at DFTQC, cooperation with the epidemiologists from the DVS should be considered and formally developed.
- Findings and interpretation of results generated by DFTQC should be presented to AH TWG, HH TWG and the OH TWG meetings.
- Results and interpretation of data analysis are presented at TWGs annually and discussed considering findings from other sectors in order to devise a more integrated AMR surveillance strategy and advise policy makers.

- Technical assistance has been provided to DFTQC to devise surveillance strategies and protocols that will ensure that data thus generated can contribute meaningfully to the country's AMR surveillance strategy and data-driven policies. Such surveillance strategies and protocols must consider activities carried out in other sectors, such as active AMR surveillance in raw milk to be implemented by CVL and DVS.

Output 5.2: To provide technical assistance to Department of Environment on AMR surveillance

WHO had planned to start a Tricycle project in January 2020, in collaboration with CVL, NPHL and University of Queensland. Given the timeline for their project and CG2 it would seem difficult to plan activities that would directly build on WHO Tricycle. However, we do expect the grantee to regularly interact with WHO to explore opportunities to align and possibly cooperate, if appropriate.

The Department of Environment currently includes a single microbiologist and the microbiology laboratory was being set up at the time of our visit. Although AMR surveillance in the environment has been included in the new NAP, they do not have a surveillance strategy, let alone protocols to implement in the environmental sector. We discussed the possibility of designing a surveillance strategy or protocols to do a survey around hospitals (e.g.: waste, water). The suggestion is aligned with concerns from other donors/implementing partners and GoN on health waste management and obtained good buy-in from the Department of Environment. As previously mentioned, another option could be to integrate them into Tricycle, but this should be discussed with WHO, once CG2 starts.

By the end of the grant we expect the following to have been achieved:

- A situation analysis has been conducted in order to present the needs for AMR surveillance in the environment in Nepal. The report should provide a set of objectives for AMR surveillance so that findings can contribute meaningfully to the country's overall AMR surveillance strategy and, in parallel, present needs in terms of capacity building and infrastructure in order to carry out these surveillance activities. Finally, the report should present a costed implementation plan in order to inform stakeholders of the investment needed and the outputs that can be expected according to investments.
- Areas of collaboration with WHO on the Tricycle project should be explored to at least allow Tricycle to be a learning opportunity for this department.

2.3 Funding envelope

Grant applications should be in the range of GBP 2,500,000-2,750,000 for the full grant period, including all capital, procurement, overhead and management costs. The Fleming Fund wishes to see value for money (VfM), and all applicants will be expected to demonstrate their understanding of VfM. The Guidance Notes for the Grant Application Form provide further information on different dimensions to be considered as part of a VfM approach.

2.4 Procurement

2.4.1 Laboratory equipment and consumables

The Grantee will need to work with further selected laboratories to finalise detailed specifications for equipment and consumables, and a procurement plan and budget should be developed by the end of the first quarter of the grant. After approval from Mott MacDonald and GoN, the Grantee will be expected to undertake the procurement of laboratory equipment and consumables. The choice of procurement route will be finalised post grant signing.

The grantee will be expected to optimize the procurement process and monitor usage/maintenance of equipment and consumables brought (through CG1 as well)

The Grantee will also be expected to:

- Undertake procurement for laboratory equipment
- Assist with the import and delivery of any equipment procured (centrally);
- Work closely with suppliers to ensure that delivery of items is sequenced appropriately;
- Maintain an asset register of all items that are defined as assets by the programme;
- Regularly monitor the items that have been procured by Fleming Fund Grants Programme throughout the course of the grant to ensure: i) items are being used as intended; and ii) items are being maintained appropriately; and
- Report any misuse or misappropriation of assets to Mott MacDonald.

2.4.2 Renovation of laboratories

The selected laboratories under CG2 may require varying degrees of refurbishment. The Grantee will need to undertake and oversee the renovation works and procurement of necessary goods that are required for the renovation of the laboratories (e.g. benches, air-conditioning units, flooring, generators etc.).

The Grantee should undertake relevant detailed site assessments for refurbishment in the first quarter of the grant. This process should use the site assessment tool provided by the Management Agent, although other tools may be used in addition if further information is required by the Grantee. In the application, please make sure that enough personnel costs are included both for sites assessments and subsequently for the design work required for renovation and management of renovation of laboratories, both of which would need to be coordinated very closely with the GoN. Grantee should also explain how they will manage the renovation of laboratories and provide details of any experience undertaking renovation work.

For the application purpose, the applicant could insert a budget of GBP £750,000, which will serve as a placeholder budget until assessments are undertaken to ascertain detailed budget for procurement of laboratory equipment, consumables, and renovation of the laboratories.

3.0 Key partnerships, alignment and coordination

The CG2 must consider current capacity levels, absorptive capacity, and alignment with other stakeholders working in Nepal and align and complement as far as possible with the national efforts. The activities must be designed to avoid duplication and development of parallel systems.

In the human health, animal health and other sectors, the delivery approach and inputs must be aligned with national priorities, as stated in the NAP and other policy and strategy documents and the support from other development partners. The resource allocation must be detailed in the workplan and budget and must transparently reflect support to the national efforts. in a transparent way by specifying resource allocation in a workplan and budget. Where possible, the workplan and budget must be jointly developed by government officials and the Grantee. Much of the success of this grant, depends upon the ability of the Grantee to bring stakeholders from multiple sectors together and facilitate joint working. The Grantee will also need to build and leverage partnerships with several AMR stakeholders beyond those in Government, to include academic, training and research institutions, the private sector, and other development partner-supported programmes. The application must spell out concrete strategies to promote the sustainability of outputs.

The Country Grant is expected to work effectively and synergistically with other grants under the Fleming Fund Grants Programme at the regional level. This relates to both the Fleming Fellowship Scheme (see Section 2.5) and Regional Grants.

It is expected that four additional fellowship positions will be added to 2nd round of Fleming Fellowship in Nepal in addition to the existing fellowships. Indicative terms of reference for all the Fellowships, currently being finalised, are attached in Annex 2.

Importantly, CG2 needs to collaborate closely with the other country grant (Policy Grant), which will be implemented in parallel to this grant. While CG2 will focus on the building foundations for AMR/U/C surveillance, the policy grant will address key policy related issues regarding AMR. The draft terms of reference for the “Policy Grant” is attached as annex 4.

4.0 Grantee Roles and Responsibilities

The main role of the Grantee – or Lead Grantee if the successful applicant is a consortium – will be to plan and implement outputs and deliver the five objectives listed in Section 6. The Grantee will be responsible for providing the expert technical assistance and high-quality support needed to achieve agreed results. The Lead Grantee will also be responsible for financial management and controls for the complete grant (including the contributions of sub-grantees if applicable), and for monitoring and reporting to Mott MacDonald. Reporting of financial expenditure against budgeted activities is a key requirement and Grantee will need to demonstrate enough capabilities to undertake these responsibilities.

4.1 Measuring success

Country Grants are ultimately expected to generate results that can be tracked using a standard set of indicators that will monitor progress and achievements within and across Country Grants. A copy of the full list of indicators will be shared in the Application Pack. However, Mott MacDonald recognises that all the suggested indicators may not all be applicable. Therefore, applicants are expected to select from the standard indicator set only where appropriate.

In summary, while the completion and level of attainment for all activities require monitoring, the type/level of activity will determine the monitoring method. When developing the application, applicants should:

- Select from the proposed indicators for activities, where appropriate; or
- Identify targets and timeframe completion for 'process' activities (i.e. activities where indicators provided are not applicable / too advanced).

In addition to measuring grant performance against the objectives and outputs stated above, the grant will also be monitored on the implementation of, and adherence to, the Fleming Fund core principles described in Section 2.4. The practical implications for monitoring on FF core principles will discussed with the successful applicant.

4.2 Application requirements

4.3 How to apply

To apply, please complete the application form, the budget and monitoring template, in line with the guidance notes. Kindly, note the key requirements set out at the beginning of the Country Grant application form:

- Your submission should be returned by the deadline indicated in the TOR.
- When submitting the application document, press "Reply All" from the Application Pack automated email that you will receive with the application documents attached. Do not send it from a new email, and do not modify the Subject-line. Only "Reply All" emails will be registered in the system.
- Keep file sizes as low as possible - there is a 9MB size limit to each individual email that can be received by the grant submission software. You can submit documents by sending multiple emails attaching submission documents to each one. Please follow the instruction on using "Reply All" to the original email.
- Observe the word limit indicated for each question. Additional words outside the limit will be disregarded.
- All documents included as part of the proposal must be submitted in Word, Excel, and PDF format (body font: Calibri 11pt). Do not send through as zipped files.
- Include a covering letter, signed by the person authorised to represent your organisation for the submission of this proposal.

Application not sent in accordance to the above criteria will not be accepted and may be returned.

4.4 Evaluation criteria

The Application Pack will include the application form, indicating the scoring and weighting for each section relevant for evaluation of the application. The Application Pack will also contain guidance notes explaining what we are looking for in terms of a good quality response for each question, including approach to Value for Money (VfM). The key areas of evaluation include:

- Technical capacity to address the different aspects of AMR covered by this Country Grant.
- Ability and preparedness to bring stakeholders together in an effective and productive working arrangement, promoting a One Health approach.
- Ability to operate effectively in Nepal.

- Key team members proposed by the grantee and partners- with required management and/or technical experience and skills to deliver the project activities.
- Clearly laid out project management plan, consortium management plan (if proposed) and clear operational plan.
- Ability and preparedness to bring stakeholders together in an effective and productive working arrangement, promoting a OH approach.
- Demonstrable value for money i.e. efficiency in the area of overall costs over the life of an activity vis-a-vis fewer overall costs in total.

4.5 Restrictions/limitations

Any conflict of interest, or potential conflict of interest, should be declared to Mott MacDonald during the application. If a conflict of interest, or potential conflict of interest arises after that point the prospective Grantee must clearly declare this in their proposal.

4.6 Key dates

- Application submission deadline: 15 September 2020**.**
- Anticipated start of grant: October 2020.

4.7 Contact details and support information

Any questions on the TOR should be sent to flemingfundSA@mottmac.com. Mott MacDonald will respond to queries within three working days.

Annex 1: List of the surveillance sites supported by Fleming Fund Country Grant

List of National AMR Surveillance Sites

S.N.	Province	National AMR Surveillance sites	Fleming Fund Supported Sites in CG1	Proposed in CG 2 (already assessed)	Proposed in CG2 (to be assessed)
1	Province-1	Mechi Hospital			
2		Koshi Hospital (KH)	X	X	
3		BP Koirala Institute of Health Sciences (BPKIHS)	X	X	
4	Province-2	NA		Janakpur Hospital *(assessed in CG1)*	
5		NA		Narayani Hospital, Birgunj	
6	Bagmati Province	National Public Health Laboratory (NPHL)	X	X	
7		Patan Academy of Health Sciences (PAHS)	X	X	
8		Kanti Children Hospital			
9		Dhulikhel Hospital			
10		Tribhuvan University Teaching Hospital (TUTH)	X	X	
11		Paropakar Maternity Hospital			
12		KIST Medical College			
13		Sukraraj Tropical and Infectious Disease Hospital			
14		Kathmandu Model Hospital (KMH)			
15		NA		X National Academy of Medical Science (NAMS)/Bir Hospital *(assessed in CG1)*	
16		Central Veterinary Laboratory (CVL) **(Animal Health Sector)**	X		
17	Gandaki Province	Western Regional Hospital (WRH)	X	X	

S.N.	Province	National AMR Surveillance sites	Fleming Fund Supported Sites in CG1	Proposed in CG 2 (already assessed)	Proposed in CG2 (to be assessed)
18		Manipal Teaching Hospital	X	X	
19	Province-5	United Mission Hospital			
20		Lumbini Provincial Hospital (LPH)	X	X	
21		Bheri Hospital			
22		NA			Rapti Academy of Health Sciences (RAHS), Dang
23	Karnali Province	Surkhet Provincial Hospital	Assessed in CG1	X	
24	Sudur Paschim Province	Seti Hospital, Dhangadhi			X
25		Mahakali Hospital			
26		Bayalpata Hospital			
27		NA		X Dadeldhura Hospital *(assessed in CG1)*	
	Total	**22**	**8**	**4**	**3**

Annex 2: Eligible funding items

Sector	Priorities
	GOVERNANCE AND DATA USE
Multisectoral / One Health	**Priorities** • Updating or renewing NAPs and surveillance strategies**.** • Further strengthening of AMR Coordination Committees, TWGs, and other AMR governance structures according to needs identified during CG1 (e.g. meeting facilitation, technical knowledge, data-driven policy design, advocacy strengthening, project coordination capacity **etc).** • Generating and recording data to influence investment case(s)**.** • Advocacy for human and financial resource allocation**.** • Improved data analysis and interpretation capacity**.** **Additional activities** • Expanding the governance structures to include other sectors. • AMR and AMU data-driven policy recommendations. • Use of AMU and AMC data from all sectors to monitor and justify changes in practices. • Use of data for intervention monitoring. • Strategies to advocate for clinical and veterinary microbiology curriculum development.
Human Health specific	National use of data **Priorities** • Advocacy for data collection and use in informing practice change. • Use of data to inform drug budgets / purchasing decisions. • Submission to GLASS. **Additional activities** • Use of national data to inform management guidelines for healthcare workers (nurses, pharmacists, medical doctors, etc.). Local use of data (e.g. hospital / regional level) **Priorities** • Establishment / strengthening of AMR site surveillance committees (or Antimicrobial Stewardship Committees / Drugs and Therapeutic Committees if they can perform this function). **Additional activities** • Use of local data to inform management guidelines for healthcare workers. • Hospital level surveillance of HAIs and evidence-based development of prevention programmes. • Surveillance for community acquired infections. • Use of data for intervention monitoring. • Outbreak detection (community or hospital/ward). • Intervention monitoring.
Animal Health specific	National use of data **Priorities** • Advocacy for data collection and use in informing practice change. • Use of data to develop best practice guidelines for animal husbandry. **Additional activities** • Use of data to inform management guidelines for veterinarians / para-veterinarians / veterinary medicine dispensers / farmers • Updating university veterinary curriculum.

	• Intervention monitoring.
Other sectors	**Priorities** • Literature review/desk-based assessment of current knowledge base for findings already available that could inform policy. **Additional activities** • Situational analysis to assess the country's needs / gaps in terms of AMR, AMU and AMC surveillance in other sectors. Analysis should include, as a minimum, recommendations for next steps and, where possible, a costed implementation plan.
AMR, AMU AND AMC SURVEILLANCE	
One Health	**Priorities** • Improve data management and analysis and interpretation capacity • Support to Tricycle or Tricycle-like studies. **Additional activities** • Investigate associations between AMU, AMC and AMR surveillance findings from multiple sectors. • Investigate relationship between isolates from animals and humans, that were generated through CG1, e.g. ○ Strain typing of the isolates. ○ PCR for specific resistance genes of interest (e.g. KPC, NDM-1). ○ Whole Genome Sequencing to look at genetic relatedness / resistance genes (requires high level of technical expertise: country grants can be supported through Regional Grant 8 and, where relevant, the Fellowship Scheme). • Integrated One Health surveillance studies beyond Tricycle. • Investigate outbreaks of resistant food-borne pathogens with a multi-disciplinary team/One Health approach.
Human Health specific	**Clinical** **Priorities** • Develop clinical engagement programmes to drive demand for improved diagnostics and data, to include. ○ Identification of, and support for, surveillance site AMR champions. ○ Inclusion of key clinicians in AMR surveillance site teams ○ Improved communication / reporting between laboratories and clinicians. ○ Development of site-level AMR working groups (if functions not covered by AMS committee / DTC) to include doctor, nurse, pharmacist and clinical officer AMR champions. **Additional** • Improving collection and reporting of clinical data for the surveillance system. • Demonstrating improved use of laboratory data. **Laboratory** **Priorities** • Ensuring laboratories function at biosafety level 2 as verified by an independent assessor. • Improving the quality management systems developed under CG1. • Improving laboratory turnaround times and reporting of critical results. **Additional** • Monitoring of sample throughput and feedback to site AMR working group to ensure ongoing improvements in laboratory utilisation. • More specimen types: e.g. urine, sterile sites.

	• Expanding testing menu e.g. confirmation of resistance methods, MIC testing. **Surveillance system** **Priorities** • Strategies to include private sector results into the national surveillance system. **Additional** • Inclusion of additional pathogens (e.g. relevant countries priorities such as multidrug resistant *B. cepacia,* or locally common bacterial infections which are major drivers for antimicrobial use). • Expanding the surveillance network (may include enhancing transport network, data management etc.). • Improving data management and analysis capacity. • Developing quality assurance processes for data. • Including community data on AMR / AMU: for example, undertaking outpatient and / or community surveys to understand use / resistance outside the inpatient setting. • Development of surveillance for hospital acquired infection. • Drug quality / quantity and consumption outside the hospital setting (e.g. private sector price and penetration). **Training and education** **Priorities** • Inclusion of AMR-related topics in Continuing Profession Development (CPD) Programmes. • Adapting health sector professionals' curriculum to include AMR.
Animal Health specific (live animals)	**Clinical** **Priorities** • Develop veterinarian / para-veterinarian / agrovet programmes to drive demand for improved diagnostics and data. • Strategies to increase demand for microbiology testing, including parasitology and virology, as a way to promote use and sustainability of laboratories. **Additional** • Improving collection and reporting of clinical data for the surveillance system. • Demonstrating improved use of laboratory data. **Laboratory** **Priorities** • Ensuring laboratories function at biosafety level 2. • Improving the quality management systems developed under CG1. **Additional** • Monitoring of sample throughput and feedback to site AMR working group to ensure ongoing improvements in laboratory utilisation. • More specimen types: e.g. urine, sterile sites. • Expanding testing menu e.g. confirmation of resistance methods, MIC testing. **Surveillance system** **Priorities** • Strategies to include private sector results into the national surveillance system. • Strengthen AMC and AMU surveillance capacity. **Additional**

	• Inclusion of more organisms (including commensals which may be of relevant to human health, and pathogens of veterinary interest). • Inclusion of more specimen types: this may include diagnostic testing (and / or active surveillance and diagnostic testing of sick animals) to understand local animal diseases which may drive antimicrobial use. • Expanding to more domestic animal species, including terrestrial and aquatic species (production and/or companion animals). • Expanding the surveillance network (may include enhancing transport network, data management etc.). • Improving data management and analysis capacity. • Developing quality assurance processes for data. • Including community data on AMR / AMU: for example, undertaking outpatient and / or community surveys to understand use / resistance outside the inpatient setting. • Development of surveillance for hospital acquired infection • Drug quality. **Training and education** **Priorities** • Adapting curriculum to include AMR.
Other sectors	**Priorities** • Strengthen stakeholders' knowledge on AMR and AMU in their field. • Development of cross-sector reporting / knowledge-sharing mechanisms. **Additional** • Food chain / value chain sampling of food of animal origin and vegetables/crops. • AMR surveillance in the environment such as hospital effluent, rivers and water, abattoir / live bird market effluent.

Annex 3: Possible Second Round of Professional Fleming Fellowships and Policy Fellowships in Nepal

5.1 Professional Fellowship under 2nd Grant- Max 4; Duration - 12 months

1. AMU Fellowship: Pokhara Hospital as the beneficiary institute for an AMU fellowship.
2. AMU fellowship at MOHP as the Beneficiary Institute for the second AMU fellowship.
3. AMC Fellowship at DDA as the Beneficiary Institute for AMC fellowship
4. The fourth fellowship could be either at
    - EDCD to strengthen their AMR Surveillance capacities
    - or at CVL or National Avian Lab (NAL) to strengthen their microbiology capacities and create a community of "expert veterinary microbiologists" who could support colleagues in other laboratories.
    - Or A clinical fellow: fellowship to a practising medical practitioner, preferably at a leadership position in Nepal government or well- respected among the medical community, who could become AMR campion.

5.2 Policy Fellowship- Max 2; Duration- 6 months

To be decided, currently being discussed with GoN.

Annex 4: Proposed objectives and outputs of the "Country Grant for Nepal (Policy Grant)"

Output 1.1 Evidence-based solutions and plans for better policies, resource allocations and governance mechanisms related to AMR surveillance developed, in all sectors.

In the human health sector, the biggest political challenge to the FF investments is that restructuring the health service to fit in to the new federal structure is still ongoing and not all lines of accountability and governance are finalised. It is unclear how national strategies (such as the NAP) will fit into this new structure. This may present a risk to both sustainability and impact.

Due to lack of evidence and absence of a strong economic case, resource allocation for AMR has been a challenge, in all sectors, and has not been adequately addressed by the policy makers in all Ministries. There is a need to undertake economic assessments of the costs and effects on patient care, health system costs and benefits of AMR and AMU surveillance, and other aspects (such as user fees, compensation, insurance) need to be explored to provide evidence and advocacy for bacteriology services across sectors. Additionally, the benefits and needs to collaborate across sectors need to be substantiated. This will allow evidence informed decision making and strengthen multisectoral collaboration.

- To address these challenges, the grantee is expected to engage policy makers and relevant ministries and undertake following activities by the end of the grant: Identifying the gaps at the systems level and review the evidence for the country's approaches to AMR surveillance within and across sectors.
- identify/suggest providing solutions based on best practices within and between sectors, which are replicable and implementable in Nepal,
- work closely with policy makers, and relevant ministries and departments to develop plans, and actions, which could be included in countries plans/policies/ambit of GoN resources/budget (across sectors).
- Provide technical assistance to make an economic case for greater resource allocation for AMR and AMU surveillance within each sector and with a One Health approach.
- Develop engagement strategies for multisectoral provincial governments/governance in support of AMR surveillance initiatives.

Output 1.2 Developing a plan for an improved and better resourced human capacity within AMR surveillance sites and other relevant departments

Availability of appropriately technically qualified human resources within the surveillance structure is also a challenge, which is due to high turnover of staff, and insufficient staff positions to undertake AMR/AMU/AMC surveillance work in the country. AMR surveillance requires, among others, clinical microbiologists and laboratory technicians trained in microbiology. To sustain the investments made by the Fleming Fund the government will need to ensure that microbiology skills are available in all the key laboratories targeted for AMR surveillance.

There is a need to undertake reforms in the procurement related policies and processes assessment. A thorough study of the procurement related processes needs to be undertaken, and this learning needs

to be passed onto the laboratory management, along with plans for procurement which facilitate the uninterrupted supply of quality assured items needed for maintaining the system.

To address these challenges, by the end of grant, the grantee is expected to undertake following activities:

- Undertake analysis to identify issues and gaps related to current HR policies etc, and suggest ways on how human resources reforms could be undertaken to mitigate the impact of high staff turnover; and advocate for human resource reforms which ensure adequate technical and administrative support is present at AMR surveillance sites and other relevant departments.

Output 1.3 Facilitate and support the Government of Nepal to set up mechanisms for coordinated efforts on AMR among development partners and other agencies working on AMR and related issues.

To strengthen collaboration and capacitate committee and group members, the grantee is expected to undertake the following activities:

- Improve NTWC and other governance structure's ability to propose policy changes, inclusive of all sectors involved, based on data gathered through the surveillance system.
- Explore ways, in each sector, in which data generated at surveillance sites, and other non-supported sites, can be used nationally to inform policy, create prescription guidelines, train prescribers on best practices; in collaboration with government institutions responsible for disease surveillance.
- Explore ways in which the AMR data generated is compatible with already existing national data surveillance systems.
- Develop a ToR for aligning/differentiating roles of EDCD and NCC (at NPHL) within AMR surveillance system.
- Develop engagement strategies for provincial governments/governance in support of AMR surveillance initiatives in the context of federalised structures. For example, this could include, without being limited to, supporting provincial reporting of passive AMR surveillance data to a federal entity responsible for managing, analysing and reporting surveillance results.