**Ethics Report Template**

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| HARM | Environmental | Reputational | Economic | Psychological | Physical |
| Direct | Areas of land will need to be deforested to make space for the bioreactor.  The Bioreactor may produce a lot of green house gasses energy from the fuels burnt to power it. | Uganda may be seen as even more dependant on first world countries, as they are relying on the UK for help. | The project will cost a lot of money and if it were to fail then Uganda’s already poor financial state will get worse. | Employees in contact with the virus will need to isolate to prevent spreading it. This may cause mental stress as they will not be able to | People could get infected if working with/near the TB virus.  People could be injured or killed by through physical labour/operation of vehicles. |
| Indirect | Local wildlife will be displaced or killed in the process.  Greenhouse gases produced will damage the ozone layer, contributing to global warming | May be taken less seriously by other countries due to being so reliant on other countries. | Other than charities, the government may need to increase the price of taxes, making it harder for people to provide for themselves. | Long periods of time isolated from loved ones could lead to depression and alcohol abuse, personality alterations and sleep problems.1 | The infection could spread to other people, causing a small outbreak  Could cause emotional trauma to co workers and family members of people who get injured or killed. |

1.) Raheel Mushtaq,Sheikh Shoib,Tabindah Shah and Sahil Mushtaq Relationship Between Loneliness, Psychiatric Disorders and Physical Health ? A Review on the Psychological Aspects of Loneliness

Environmental

Finding a clear area that is free of wildlife and forestry will reduce the effect that the construction of the bio reactor will have on the environment. However, this may not always be possible, so deforesting an area of land could be an option, as long as tree’s are replanted in an area nearby. Using a clean way of generating energy that will be used for the bioreactor is also very important. Nuclear is a good way of generating clean energy, but is expensive. A cheap and carbon neutral way of burning energy is through the burning of biomass as it reduces a lot less CO2 than fossil fuels. However, due to a large lake, the Lake Victoria, a hydroelectric dam could be constructed as not only a means to power the bioreactor, but also to power some homes in Uganda. This however comes with it’s own environmental issues, as the construction of the dam will require the use of machinery such as cranes, trucks and excavators, all of which will produce green house gases during operation. Furthermore, the construction of a hydroelectric dam is likely to be very expensive. That being said, the benefits of having a sustainable and environmentally friendly source of energy is worth the price.

Physical

Ensuring that all workforce employees are properly trained is essential for to keep everyone safe. In doing this, the chance of an employee misusing any equipment and harming themselves or others will be drastically reduced. Furthermore in teaching the employees how to operate the bioreactor correctly, the production of the vaccine is likely to be much more efficient. Another way to keep people out of physical harm is by providing PPE (Personal Protective Equipment). This, as long as educating employees about how live samples of the virus should be handled, will reduce the chance of a possible outbreak within the workforce. While PPE does cost money to provide to the work force, it also highly reduces the chance of infection, which means workforce employees are less likely to get sick and will be more capable working for longer

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| Issues that may arise | How to mitigate them |
| 1. More job opportunities arise as a result of this project, allowing the people of Uganda to become better trained for work. 2. People in positions of power may restrict the access to the vaccine, either by only distributing to those with high status / “correct religion”or by making the vaccine unfairly high priced. 3. The project is likely to cost a lot of money, meaning that this may cause some strain on Uganda’s already weak economy, potentially driving themselves indebted to other countries helping in the project. 4. Provided the project is successful, the amount of people who will suffer from the TB virus will significantly decrease. 5. The environment could be impacted by the development of the bioreactor, potentially causing animals to have to relocate, which could cause issues to hunters/farmers in the area. | 1. Encouraged like any normal paying job is, through a decent salary 2. Vaccines could only be distributed by Non-Governmental organisations, as the majority of the government owned medical practices provide services based on the patient’s religion2. 3. The money for the project could be fundraised by some charities, reducing the overall cost that Uganda will have to pay for the bio reactors construction. 4. This should be encouraged by encouraging the general public about the benefits of taking a vaccine, and by making the vaccine as accessible as possible to as many people as possible. 5. Construction should be carried out in an area that causes the smallest amount of negative impact to wild life and small scale local businesses . |

2.)The World Bank (2010). "Fiscal Space for Health in Uganda". *Africa Human Development Series*.