Initial Environmental Examination (Draft)

June 2018

Sri Lanka: Science and Technology Human Resource Development Project —Proposed Faculty of Engineering Building Complex, University of Sri Jayewardenepura, Sri Lanka

Prepared by the University of Sri Jayewardenepura, Sri Lanka for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 31 May 2018)

Currency unit	–	Sri Lanka rupee/s (SLRe/SLRs)
SLRe1.00	=	$0.00633
$1.00	=	SLRs158.03

NOTE

In this report, "$" refers to US dollars unless otherwise stated.

INITIAL ENVIRONMENTAL EXAMINATION

PROPOSED FACULTY OF ENGINEERING BUILDING COMPLEX IN UNIVERSITY OF SRI JAYEWARDENEPURA

PART I: IEE

SRI LANKA- PROPOSED FACULTY OF ENGINEERING BUILDING COMPLEX IN UNIVERSITY OF SRI JAYEWARDENEPURA

Project Number:

May 2018

Prepared by TMS for University of Sri Jayawardenapura, Sri Lanka

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ABBREVIATIONS

ADB	Asian Development Bank
AP	Affected Person
BO	Built operate
BIQ	Basic Information Questioner
BOQ	Bill of Quantities
BD	Building Department
CAP	Corrective Action Plan
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
COC	Certificate of Conformity
DBO	Design-built-operate
DMC	Developing Member Country
DOF	Forest Department
DPC	Damp-proof couse
DSD	Divisional Secretariat Division
DM	Disaster Management
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EPL	Environmental Protection Licenses
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EMP	Environmental Monitoring Plan
ESMP	Environmental Social Monitoring Plan
FOE	Faculty of Engineering
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GND	Grama Niladari Division
HPS	Homagama Pradehiya Saba
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
IP	Indigenous Peoples
IR	Involuntary Resettlement

ILO	International Labor Organization
LFS	Labour force survey
M&E	Monitoring & Evaluation
MOFP	Ministry of Finance and Planning
MOHEH	Ministry of Higher Education and Highway
MMDE	Ministry of Mahaweli Development and Environment
MSL	Mean sea level
NEA	National Environmental Act
NIRP	National Involuntary Resettlement Project
NWRB	National Water Resources Board
NWSDB	National Water Supply and Drainage Board
PAA	Project Approving Authority/Agency
PBC	Performance Based Contracts
PIU	Project Implementation Unit
PMC	Project Management Consultant
PMU	Project Management Unit
PP	Project Proponent
REA	Rapid Environmental Assessment
SLEC	State Level Empowerment Committee
SLLRDC	Sri Lanka Land Reclamation and Development Cooperation
SPS	Safeguard Policy Statement
STHRDP	Technology and Human Resource Development Project
TA	Technical Assistance
TDP	Technology Stream Degree Programmes
TMS	Total Management Solutions
UDA	Urban Development Authority
UGC	University Grant Commission
UOSJP	University of Sri Jayewardenepura
VEC	Valued Environment Component
WRB	Water Resource Board

EXECUTIVE SUMMARY

A. Introduction

1. Government of Sri Lanka with loan funding from Asian Development Bank (ADB) has proposed to implement Science and Technology and Human Resource Development Project (STHRDP). The Ministry of Higher Education and Highway (MOHEH) shall be the Implementing Agency and the University Grant Commission shall be the executing agency for the Project. This project aims to increase the technology oriented work force to transform Sri Lanka's growing economy. Under this Project, the University of Sri Jayewardenepura (USJP) will build a new Faculty of Engineering (FOE). This will be referred to as the 'project' in this report.

2. The safeguards screening for USJP has been completed by the consultants mobilized under TA8235. In pursuance of the above, Total Management Solutions Company (Pvt) Ltd (TMS) was appointed as the Consultants by ADB.

B. Objectives of the IEE

4. The objectives of the Environmental Study are to:

- Determine the category of the project depending on improvement proposal, environmental sensitivity and magnitude of impacts, i.e. screening as per Government of Sri Lanka's regulations and ADB's Safeguard Policy Statement 2009;
- Determine the appropriate extent and type of EA required (IEE or EIA), i.e scoping;
- Determine the requirement of statutory clearances;
- Baseline environmental monitoring and survey;
- Prediction of impacts on relevant environmental attributes and mitigation measures to minimize the impacts; and
- Preparation of IEE Report including ESMP

C. Description of the Project

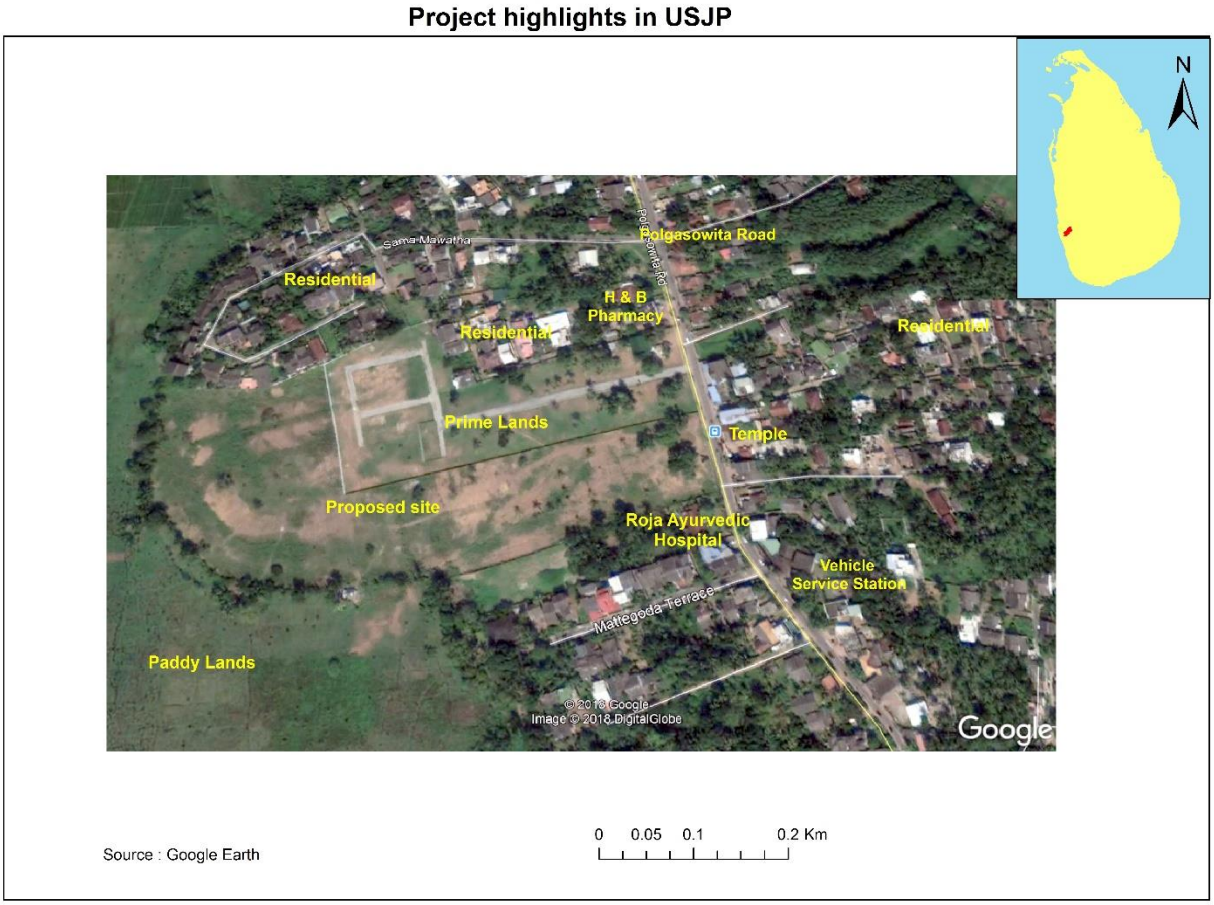
5. The proposed construction of the new Faculty of Engineering (FOE) is located in Homagama in the Colombo District, Western Province, Sri Lanka. The project site (i.e. land) is located alongside the Kottawa Road and is within 1km of the Kottawa town. The land location points are 6°49'26.1"N+79°58'04.7"E. The government granted the university with a 15 Acers, 01 Rood and 32.9 Perches land located in Maththegoda GND, Homagama DSD. Adjoining properties are privately owned for residential purpose by Prime lands (Pvt) Ltd, paddy cultivation, etc. The proposed project site is located 7.43 km from the existing premises of University of Sri Jayewardenepura.

6. Establishment of the FOE with training on subjects such as Civil Engineering, Computer Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Interdisciplinary studies, etc. will improve the job security for these graduates in the local as well as global job market. Graduates from University of SJP Faculty of Engineering will have a competitive edge to secure jobs in the future.

7. The proposed FOE is composed of spaace for the Mechanical Engineering Department (4625sqm^2), Electrical and Electronic Department (5475 sqm^2), Computer Engineering Department (4375sqm^2), Civil Engineering Department (6225sqm^2), Common Academic facilities along with the IS Department (4245 sqm^2 Welfare and Recreation (3225 sqm^2), and Administrative Division (6875 sqm^2). The number of buildings will depend on the Master Plan to be developed by the Contractor.

D. Project Highlights

Figure D1: Project highlights in USJP



Source: Prepared by TMS

1. Project Information

Table E1: Salient Existing Features of the Project

Funding	Rs. 7.8 Billions (Rs.7800 Millions)
Approximate student capacity	1530
Total sq meter area of all the building in the faculty	30420 m^2
Civil engineering department 6 floors Total area 4375 m^2	Laboratories 13 Teaching facility (Lecture halls 200 and 100 occupancy) Staff and administration Recreation and common room Canteen
Electrical and Electronic Engineering Department 4 floor Total area 5475 m^2	15 Laboratories Teaching facility(Lecture hall 200 and 100, Research center) Staff and Administration Recreation - Common room Canteen other requirement
Mechanical Engineering Department	12 Laboratories Teaching facility (Lecture hall 200 and 100 research center) Staff and Administration Recreation - Common room Canteen other requirement
Computer Engineering Department 6 floors Total area 6225m^2	Laboratories 12 Teaching facility (Lecture halls 200 and 100 occupancy) Research center Recreation - common area Main Canteen 800 m^2 other requirements on the ground floor
IS department 3 floors Total Area - 4245m^2	Labororatory Staff and administration Teaching facility 400 capacity and 200 capacity Examination hall Language lab Recreational Canteen 600
Welfare and Recreation 4 floors	Reading area Medical Center

Total Area - 3225m^2	Faculty book shop Mini gymnasium Staff lodge and guest house Drivers and minor staff
ADMINISTRATION DIVISION 4 floors Total Area 6875 m^2	Faculty office Teaching facility – Auditorium capacity 800 with 750 m^2 IT center Language center Library Incubation center Recreational
Land Use	Rural landuse with residential. Main crops cultivated are paddy and coconut.
FOE Courses	Civil Engineering Computer Engineering Electrical and Electronic Engineering Mechanical Engineering Interdisciplinary Studies

2. Annual Students Enrollment to the Faculty

8. Five undergraduate courses in Bachelor of Civil Engineering, Electrical and Electronic Engineering, Computer Engineering, Mechanical Engineering and Interdisciplinary studies is introduced at FOE in USJP. This involves admission to the university in two intakes 120 students each year for the Faculty of Engineering.

3. FTC Graduate Employment Prospects

9. The FOE at the University of Sri Jayawardhanapura with the establishment of the Industry Advisory Board (IAB) has developed strong industrial linkages that will assist the graduates to secure employment in the emerging job market.

10. Willingness to implement cutting-edge technologies in education and research at FOE with staff who are experienced in technology and research would ensure the training of graduates to be highly skilled. FOE's main areas of focus includes, Civil Engineering, Computer Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Interdisciplinary studies etc. These fields have a growing

demand in the international and local job market and hence ensure job security for the future graduate.

E. Policy, Legal and Administrative Framework.

11. As per the ADB's Safeguards Policy Statement of 2009 and based on the REA Checklist of ADB classification, the FOE is categorized as environment category B. According to the BIQ and IEE/EIA environmental guidelines of Central Environmental Authority of Sri Lanka (CEA), the proposed project falls in to the non-prescribed category. Therefore environmental clearance (EIA or IEE) will not be required from the government of Sri Lanka to proceed. The IEE was carried out as a requirement of ADB under its safeguards policy to be eligible for their financing.

12. Main objective of this IEE report is to prepare a comprehensive account of the current environment condition of the selected site for the construction of the FOE in Homagama Divisional Secretariat, Colombo District. It also aims to identify any potential negative environmental or social impacts in the immediate vicinity or surrounding areas that maybe short term or long term. Accordingly, a single consolidated IEE report is submitted for ADB to facilitate their decision making.

13. Field observation of the project site within Homagama Divisional Secretariat was carried out on 28th of September 2017. During the site visit, the REA, IP and IR checklists were filled and the findings incorporated in the IEE. During the inspection, activities assessment was done on existing location and identification of project associated sensitive areas. This involved the assessment of the resettlement issues and accessibility and road connectivity issues of two families. The stakeholder consultation was held on 17th May 2018 at the Faculty of Graduate Studies at USJP in Gangodawilla, Nugegoda. Consultation were carried out with villagers, residents adjoining the property, officers from authorities, USJP students, and USJP FOE academic staff. To obtain additional information, key informant interviews were carried out with the Agrarian Services development officer assigned to the area. Other reliable information was collected from villagers and respective authorities during public consultation meetings. Secondary information for the report was gathered from printed materials such as the geotechnical report and the project proposal to ADB and

other sources of the relevant information from Government Departments (UDA, CEA, etc), authorities, Divisional Secretariat and relevant websites.

14. The CEA's consent for the projects under non-prescribed category has not yet been obtained, however, the process has been initiated. A summary of the statuary clearances required for the FOEP is presented in Table- E.2.

15. Apart from the clearances for the overall project work, the contractor, before starting the construction work, has to obtain required Clearances listed in Table- E.3. for operating his equipment and carrying out construction work.

Table E2: Statutory Clearances required for the Project

Type of Clearance	**Activity**	**Authority**	**When required**
Environment Clearance Environmental Protection Licensing) Regulation No. 1533/16 of 2008	Implementation of the project and waste water treatment recommendations to be adopted in the design.	CEA	Before construction
Clearance for development activities to obtain the green building certificate (refer Annex 01)	Implementation of the project and construction of the building.	UDA	Before construction for green building approval
Clearance from Department of Agrarian Services act No46 of 2000 sections 83,84, &85	Management of Irrigation canals and controlling erosion	Department of Agrarian Services	Before construction
Local Government Authorities building approval	The Municipal Councils, Urban Councils and Pradeshiya Sabhas share the powers regarding the approval of buildings plans, control of solid waste disposal, sewerage and other public utilities. Under these laws the new construction requires approval. Adhere to building regulation	Local Authority (Homagama Pradeshiya Saba)	Before construction for green building approval
Approval for removal of trees on site	Site clearance to have space for the building and to provide aces and material storage	District Secretariat	Before construction

Consent from relevant government agencies	Construction of building and culverts and other drainage systems etc	Urban Development	Before construction
Consent from Ceylon Electricity board	Obtaining the electricity supply for the FOE complex	Ceylon Electricity Board	After completion of the building
Water Supply	Supply of potable water for the facility and supply the certification of pumping drainage	NWSDB	Before construction
Telecommunication supply	Connection of telecommunication for the building and equipment	TELECOM	After completion of the building

Compiled by TMS

Table E3: Clearance required to be obtained by the Contractor

No	Construction Activity &	Statutory	Statute Under which

	Type of Clearance Required	**Authority**	**Clearance is Required**
1	Consent for Establishment of Stone Crushers and Cement Mixing Batching Plant	CEA	National Environmental Act No. 47 of 1980
3	Permission for extraction of sand, metal from soil	Geological Survey and Mines Burea (GSMB)	Geological Survey and Mines Bureau (GSMB) Act No. 33 of 1992
4	Location and layout of workers camp, & equipment and storage yards	Homagama Pradeshiya Saba (PHI from Kahathuduwa)	Local Government Ordinances and Acts – Urban Council Ordinance 61 of 1939, Act 29of 1947, Act 18 of 1979, and Act 13 of 1979
5	Discharges from labour camp	Central Environmental Authority (CEA) Homagama Pradeshiya Saba	National Environmental Act No. 47 of 1980 National Environmental (Protection & Quality) Regulations, No. 01 of 1990
6	Disposal of solid and liquid waste	Central Environmental Authority (CEA) Homagama Pradeshiya Saba Department of Agrarian Service Development	National Environmental Act No. 47 of 1980 Agrarian Services Act No46 of 2000 Pradeshiya Sabhas (Amendment) Act No 14 of 1999 an act to amend the Pradeshiya Sabhas act, No. 15 of 1987
7	Noise and dust pollution during construction activities	CEA	Air (Prevention and Control of Pollution) Act, 1981 National Environmental (Noise Control) Regulations No. 01 of 1996
8	Disposal of spoil material garneted during building and construction	Homagama Pradeshiya Saba	National Environmental Act Act No. 47 of 1980 Pradeshiya Sabhas (Amendment) Act No 14 of 1999 an act to amend the pradeshiya sabhas act, No. 15 of 1987

9	Revenue license for the heavy machinery and other vehicles at the work site	Office of provincial Commissioner for Motor Traffic the vehicle is being registered	Motor traffic Statute of Western Province No 7 of 1991.
10	Engagement of Labour - Labour License	Labour Commissioner	Shop and office Employees Act 1934 Employees' Trust Fund Act No 15 of 1980 established the Employees' Trust Fund (ETF). Employees' Provident Fund Act of 1958 Municipal Council Ordinances and Acts – Urban Council Ordinance 61 of 1939, Act 29 of 1947, Act 18 of 1979,
11	Engagement of Labour- • Social Security- • Labour Welfare- • Wages	Labour Commissioner (Ministry of Labour and Employment	The Employees' Provident Fund Act, 1958 & Miscellaneous Provisions 1975 Workmen's Compensation Ordinance of 1935 and subsequent Amendments hop and Office Employees (Regulation of Employment and Remuneration) Act, 1954 Factories Ordinance, 1942 2010 on fair treatment

Source: Compiled by TMS

16. In addition to the above, Contractor has to obtain

- Insurance relating to 3rd party, workmen compensation
- Permission from the LA to set up labour camps
- Change of land use certificate from the Divisional Secretariat of Homagama

F. Description Of the Environment

17. The existing environmental conditions of the study area covering the Homagama Divisional Secretariat. FOE development project is located in the Homagama DSD,

extent of 11,815.5 hectares with 81 GND. There are several crucial environmental challenges facing the Homagama DSD including improper land use planning, unauthorized construction and leading to water pollution and improper solid waste disposal etc.

- **Seismicity**

18. The project is located in the western province of Sri Lanka which is not an active seismic region. The area does not have any potential risk of damage due to earth quake

- **Land Use**

19. The land use pattern in the project site is suburban area with predominately mixed development. Project surrounding land can be categorized into residential and commercial area (4%), cultivation area (40.96%) Tanks / Reservoirs (0.64%) and Home gardens (50.62%). Land use of the project area consists of private land, state land, residential land, industrial land, and several natural habitats, (wetland and stream).

- **Geology, Soil and Topography**

20. The topography of the selected land is a part of a sloping plank of rolling ground typical in the type of terrain. The soil found in selected site is a thin prism of colluvium type depositional soils and a comparatively very thick prism of residual soils..

- **Climate and Meteorology**

21. Homagama division lies within the wet zone in the country with flat train. It experiences a uniform rainfall pattern. The maximum rainfall is experienced in November Annual rainfall within the area is 234 mm. The average temperature is 23°C - 33°C in this area. Meteorological data at the site is summarized in Table F.4

Table F4: summarizes the metrological data for the site

Parameters	**Amount Jan –Dec 2017**
Maximum Temperature(^{0}C)	35 ^{0}C
Minimum Temperature (^{0}C)	23.88 ^{0}C

Maximum Relative Humidity (%)	96%
Minimum Relative Humidity (%)	4%
Total Rainfall (mm)	3450 mm
Average Wind Speed [CK1]	10 mph
Predominant wind direction	West
Dry hours (%)	More than 95%

Source: https://weatherspark.com/y/110076/Average-Weather-in-Homagama-Sri-Lanka-Year-Round

Ambient Air Quality

22. To draw up a baseline status of the ambient air quality the SJP will take the measurements prior to the commencement of the development project.

- **Ambient Noise Level**

23. To assess the baseline value for the background noise level, ambient noise monitoring will be conducted by the SJP prior to the construction activities at the site.

- **Surface and Groundwater Quality**

24. The baseline data on water quality will be collected for two locations within the project area by the SJP and will be monitored, analyzed and assessed during the construction and operational period. The water quality results will indicate quality of the adjoining surface water. An assessment of water quality will be done to check coliform count, BOD, COD to obtain the baseline value. Before the construction it is recommended that the above test be carried out.

- **Ground water**

25. Ground water was not encountered in the boreholes at the depth from 0.75m – 8.75m in the boreholes. The depth to the ground water table in all the boreholes except BH 3 is in range of 5m – 8m and in BH 3 it is at 0.75m depth. Under the above circumstances, it is assumed that the pore water pressure will not have any effect at the shallow elevations of the sub soils in BH 1, BH 2, BH 4, BH 5 and in BH 6 for the evaluation. It is also assumed that the sub soils of the shallow elevations at the BH 3 are under fully saturated conditions simulating worst conditions as far as pore water pressure is concerned (refer soil report in Annex 2).

26. **Bio Diversity**

There was no biodiversity assessment done for the site since it already a developed site and in an urban setting by the side of a main road. There was no significant biodiversity to be observed at the site since land was developed. However, downstream along the southern and western border, there may some biological diversity since it borders approximately 10 acres (part of a 40 acre system) of abandoned paddy due to non-availability of a maintained water system.

G. Educational, Medical and Religious Properties

27. Generally the education level is good with literacy rate being around 95.4% (Department of Cense and Statistics, 2015). Educational facilities in the area include 37 schools. Health facilities in this area include base hospital, peripheral units, central dispensaries, maternity homes and dispensaries.

28. Cultural, archaeological and historically significant sites in Homagama DSD include the Embulgama Purana Viharaya and Meegoda Purana Viharaya, Lenagala Rajamaha Viharaya.

Table G5: Distance from religious sites

Description	Dist. between center line of the project and boundary wall of the religious site
Embulgama Purana Viharaya	13.04 Km
Meegoda Purana Viharaya	10.87 Km
Lenagala Rajamaha Viharaya	8.05 Km

H. Demographic details of Affected Population

29. The population and community in this area are predominantly Sinhala. The population composition all ethnicities such as Sinhala, Tamil, Lanka Yonaka, Burgher and others. When considering the ethnicity within the DSD, 96.98% of the population is Buddhist,

0.44% are Hindu, 0.71% are Islam, 1.06% are Roman Catholic, and 0.73% are Christian.

30. The agriculture sector provides employment for 4.98%, 5.29% in industrial sector and 21.96% in service sector in total labor force in the Homagama DSD. Population in Homagama engages in agricultural, industrial and fishing with some employed in the government sector. The predominant work force in Homagama engages in the service and industry sectors.

I. Analysis of Alternatives

31. Although the proposed FOE project is located in close proximity to a paddy field, impacts associated with construction stage are temporary and short term. Any long term impacts can be managed by adhering to the ESMP. Also, there is no existing facility in the vicinity that can be developed as an alternative to the proposed project. Therefore, examination of alternatives to the project‘s location, design, technology, and components show that it is compliant.

32. The selected site is strategically located in the Western Province and within close proximity to Kottawa Expressway exists that connects with the major expressways in Sri Lanka: Biyagama and Katunayake export processing zones are 15.05 Km and 39.55 km respectively from the site. Such road connectivity makes the location easily accessible to the student community.

33. The site is 8.03 km from the proposed Green Tech City development under ministry of Megapolis and Western Development. It is also within 7.43 km to the main UOSJP Campus in Nugegoda and therefore student and staff can easily commute.

J. Anticipated Impacts and Mitigation Measures

34. An ESMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. Locations and siting of the proposed infrastructures were considered to further reduce impacts. These include (i) locating FOE on government-owned land to avoid the need for land acquisition and relocation of people. However, this project involved relocation of 2 families (illegal settlements) due to access issues.

35. The ESMP includes design measures such as (i) selection of construction methodology on red- yellow podzolic soil. (ii) quick leak detection and rectification to save the resources, etc. during construction. The ESMP includes mitigation measures such as (i) implementation of noise and air quality management (ii) use of dust-suppression methods such as watering and/or covering of stockpiles; and (iii) managing both solid and liquid waste generated.

36. As for the O&M phase, facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent. During operation, solid waste management and waste water treatment are important aspects to be considered in the design and implementation. The design of the waste water treatment plant includes dewatering and drying areas as part of sludge management. The ESMP includes mitigation measures and monitoring plan to ensure compliance to environmental standards during O&M phase.

37. A summary of the potential environmental impacts during construction and operation phase along with recommended mitigation measures is summarized in a Table-J6

Table J6: Summary of Anticipated Impacts and Recommended Mitigation Measures

Issues of concern	Anticipated Impacts	Proposed mitigation Measures
Pre-Construction and Construction Stage		
Clearance for the project	In the absence of relevant approval from the department of Agrarian service development, UDA and CEA for the new development may lead to environmental and social consequences.	Obtain CEA, recommendation letter and approval letters from, UDA, Agrarian Service letter with limits on the reservation and other parameters.
	Lack of sufficient planning to assure long-term sustainability of the improvements and ensure protection of the FOE	Design has to include provisions for ensuring effective maintenance and protection of the FOE in the long-term. The long-term sustainability has been ensured by consideration of relevant authorities for Standards The initial designs of FOE academic building should consider that net allowable carrying capacity of 3.0MN/m^2. The carrying capacity in skin friction within the basement

		rock or the ultimate skin friction coefficient is 140 kN/m^2, which is more than ICTAD recommended guidelines and propose the design. Refer the geotechnical soil assessment recommended design for the structure.
Involuntary resettlement	The building of the boundary wall of the FOE along the Southern boundary adjoin the paddy land, will cut off access to 2 unauthorized and semi-permanent low income households.	Take measures to provide alternative location and compensate. Prime Lands have already offered compensation.
Integration of energy efficiency and energy conservation programs in design of project components. Non compliance of green building guidelines	Unsustainable, energy inefficient, and un-economical unviable building that will negatively impact the environment In the absence of water conservation and energy efficiency of the building structure, it may lead to resource constrains and increase the running cost.	The detailed designs for the project should ensure environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, etc.: - Usage of recyclable materials like wood substitutes. - Installation of sustainable energy efficiency certified equipment - Usage of energy efficient lighting fixtures (LED) - Provision of photovoltaic cells on roofs for solar power - Rain water harvesting structures planned for ground water recharge and rain water collection. - Conduct stakeholder meetings regularly during construction phase. - Provide a fund for compensation if it becomes necessary (damages to property etc.).
Establishment of baseline environmental conditions prior to start of civil works	Non availability of a method to audit the impact. Obtaining a suitable and representative baseline data set will be critical to the whole monitoring and audit process because it forms the standard against which environmental impacts are assessed.	Conduct documentation of areas for construction zone (camp, staging, storage stockpiling, etc.) and surroundings (within direct impact zones). Include photos and GPS coordinates Conduct base line monitoring in respect of ambient air quality, water quality, and noise levels as per monitoring plan.

	Impact of vibration noise, ground water pollution due to solid and waste water disposal etc.	Thus, baseline monitoring for water quality, noise, vibration will be audited prior to the start of construction and in site supervision.
Utilities	Establishment of utilities for the FOE such as water, telecommunication and electricity will disrupt the services to the project associated establishments and communities.	-The location of utilizes and operators of utilities to be impacted should be identified and documented in detailed project design documents to prevent unnecessary disruption of services during the construction phase. -Contractor should prepare a contingency plan to include actions to be done in case of unintentional interruption of services. -Obtain from the PIU the list of affected utilities that need to be shifted.
Resources mobilization and allocation of space	Allocation of space for storage yard for construction material, labour camp, project office require addition amount of space. Use of additional land for resource mobilization during construction may lead to conflicts. (Most probably will not be needed as there is sufficient space).	Adequate provision should be made on site to mobilize the construction equipment. Selection of land for construction material storage should be done carefully avoiding conflict with Homagama Pradeshiya Saba approval. (Only if the need arises) Sitting of the construction camp shall be as per the guidelines below and details of layout to be approved by PMU. Potential sites, within the FOE plot, for the labor camp will be lined up to be visited by the environmental expert of PMU Construction camp sanitation facilities shall be adequately planned. Selection of local un-skilled and skilled workers for the proposed construction activities can reduce the requirement of land for labour camps.

		Use local materials as much as possible to reduce the need for storage space.
Disaster management	Extreme climate events such as intense rainfall (flooding), cyclone etc. and fire may cause damages to lives and property.	An appropriate adaptation and disaster risk reduction strategy should be developed. Identify an emergency evacuation point in the building. An emergency alarm system has to be in place in all the buildings. Install a lightening receptors to minimize risk of lightening damage. Schedule the maintenance and cleaning of the canal system associated with the project.
Safety of students and academic staff	Lack of safety measures within the design will lead to fire and increase occupational safety hazards	Plan for fire extinguishers fire alarms and a stair case for emergency evacuations. Fire safety management and mock drill.
Occupational Health and Safety	Unless worker safety is complied with, it can lead to injury and other health risks	Contactor to comply with ADB Environmental, Health, and Safety Guidelines, Labour Organization (ILO) convention No. 62, and Factory Ordinance to the extent that are applicable Develop and implement comprehensive site-specific health and safety plan on Occupational Health and Safety. Include in the health and safety plan measures as per the detailed ESMP (Part III). Provide medical and indemnity insurance coverage for workers.
Public consultation	Inability to resolve environmental impact on surrounding community due to project based activities may	Continue information dissemination, consultations, and involvement or participation of stakeholders

	trigger social unrest	during project implementation.
Site clearance and cut and fill operations	Construction activities such as cut and fill operation etc. may lead soil erosion, sedimentation and siltation. Decrease of infiltration of rain water and acceleration of surface runoff.	Only ground cover or shrubs and trees that directly affect the permanent works or necessary temporary works shall be removed with prior approval from the environmental expert of the PIU. See ESMP (Part III) for detailed presentation of mitigatory measures.
Land preparation	Activities such as site preparation of site will potentially impact the ecological resources.	Awareness programs should be organized for the workforce. Contractor should especially be careful not to introduce any alien species during the activities.
Soil erosion and water ponding on account of excavation.	Incidence of vector born disease Down ward daft of soil towards the middle canal increasing chances of flooding and clogging up of the existing canals. .	Slope protection measures will be undertaken as per design to control soil erosion especially on side slopes of access and internal roads. The excavation works will be avoided during monsoon months to avoid soil erosion, stagnation of water, and vector – borne diseases. Temporary slope protection may be required during construction at the excavated areas. Adequate measures will be taken up so that there is no soil erosion causing risks of in-filling of drainage ways in the vicinity.
Drinking water availability at construction camp and construction site	Non availability of drinking water for labours will result in dehydration and health risk Lack of usable Ground water may lead to water constraints at the construction site.	Sufficient supply of potable water to be provided and maintained at the site for the workers. The drinking water will be obtained from the market or any alternative source. The drinking water will be stored in a suitable size storage tank to ensure uninterrupted availability.

Arrangement for construction water in the event water requirement is large for construction and cannot be supported by the pipe water supply	Delayed and interruption water supply leads to economic cost	The contractor shall provide a list of locations and type of sources from where water for construction shall be acquired. To avoid disruption or disturbance to other water users, the contractor shall arrange water from the market through authorized tanker suppliers etc. unless a dedicated water line is established before commencement of construction.
Use and transport of natural resources	Impact on the natural ecosystem by means of exploitation.	Extraction of construction materials should be undertaken only from mines and quarries approved by GS&MB Extraction of material from CEA, LA approved sites and conforms to regulation imposed by the DS. Transportation of material should be carried out in accordance to the regulations imposed by the relevant authorities.
On site housekeeping	Lack of solid waste and sanitation management on site can lead to lack of general cleanliness and impact on ecology, public health and scenic beauty.	Pre identified waste disposal site by the contractor should exclude areas which are close to public and sensitive environment. This is part of the comprehensive waste disposal plan. A solid waste management plan will be prepared by the contractor in consultation with local civic authorities
Stockpiling of construction materials	Pollution of water ways	-Stockpiling of construction materials will be done in such a way that it does not impact and obstruct the drainage. -Stockpiles will be covered to protect from duct and erosion
Air pollution	Impact from dust generation leads to Poor air quality release of Volatile Organic Compound (VOC) from storage sites and transfer of vehicle/equipment	Wet down and spray water at construction site, quarries if required. Take steps to avoid dust

	fuels, emission of small amounts of Carbon monoxide, Nitrogen dioxide and particulates from construction activities and vehicles may compromise health of the workers and surrounding community.	emissions during loading and unloading of construction material. Tarpaulin covering is mandatory on trucks/lorries All filling works are to be protected or covered in a manner to minimize dust generation The air quality monitoring will be conducted as per the plan All vehicles, equipment, and machinery used for construction shall conform to the Sri Lankan government vehicle emission test. For equipment emission norms as specified in air emission gazetted under NEA The Contractor shall maintain a record of pollution under control for all vehicles and machinery used during the contract period.
Impact from noise and vibration	Construction noise can disturb surroundings	Maintenance of machinery and equipment in a good condition, Limit working time for activities that create noise etc.
Onsite emergency plan for minor accidents and mishaps	Accidental risk to the worker.	Onsite emergency management plan will be prepared by the contactor with the consultation of the PIU.
Clearing of construction of camp and restoration	It will not be visually pleasing and would lead to health risk	Contractor to prepare site restoration plans for approval by the engineer (PIU). The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish removed, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense, to the entire satisfaction of PIU.
Landscaping	In the absence of proper landscape will not be	Project landscape activities have to be done as per either detailed

	aesthetically pleasing. Landscaping should blend in with the ecosystem.	design or typical design guidelines. The landscaping works will have to be identified by the Contractor Plant floral species that are recommended in the IEE
Operational Period		
Environmental conditions and parameters	Unless regular monitoring is conducted, it may lead to environmental pollution issues during the operation of the Campus.	Periodic monitoring of the ambient air quality, noise level, surface water quality, soil quality in the subproject area as suggested in the monitoring ng plan through an approved monitoring authority.
Drainage Congestions	Flooding due to lack of maintenance on the canal system around the project site	Surrounding canal system in Homagama Pradeshiya Saba
Solid waste management	At the moment solid waste collection is done twice a week , there is risk of solid waste piling up on site and obscuring the environment.	Adopt an agreement with the LA and put into operation the waste management plan in place.
Water supply	This should be properly calculated for the purpose of available toilets based on student numbers.	Ensure that water supply is in place before operation to the training center.
Sanitary facilities	Poor maintenance of sanitary facilities and improper disposal of domestic waste water will result in environmental pollution and spread of diseases	Ensure that the facilities are properly maintained and with adequate supply of water The septic tanks will be emptied regularly or waste water treatment plant installed.
Health and safety of the trainees	Activities such as laboratory work may result in accidents injury among students. Social conflict with the surrounding residents and worker in other establishment due to unacceptable behavior of students	Train the students and teachers on managing risk and emergencies. Provide emergency switches to prevent fire hazards. Place rules and regulations and code of social conduct that is required to be maintained by the student.
Waste generated on account of operation and maintenance	Collection of waste will obscure the environment.	The solar thermal panels and water will be operated by the supplier. Any waste that is generated will be taken by the supplier for possible reuse and recycle. For this necessary

		agreements will be made.
Onsite emergency plan for minor accidents mishaps and disaster management plan. For natural disaster such as flooding	Lack of disaster preparedness may cause risk to many lives.	The dean of the FOE of UOSJP should prepare an onsite emergency plan for possible minor accidents. During the operation phase. For natural disaster the disaster management plan prepared by USJP will be followed.
Maintenance of plantation and landscaped area in the FOE project site	In the absence of maintained landscape, FOE grounds will not be pleasing to the eye.	The faculty head with the appropriate support staff allocated for the purpose will be responsible for the maintenance of shrubs, tree and land scape of the area.
Adoption of Food safety guidelines	Unhygienic food preparation conditions may lead to health issues in the cafeteria	Adopt rules on personal hygiene. Adopt food safety regulation for the cafeteria which is imposed by the Ministry of Health.

Source: Compiled by TMS

38. The budgetary provision for the implementation of the ESMP of the FOEP can be categorized in to two types and is presented below;

- ESMP works to be implemented by the contractor under civil works contracts.
- ESMP works to be implemented by the FOEP project management unit.

39. A capital cost provision of about Rs. XXX has been allocated for the implementation of the ESMP. Summary of the budget is presented in Table-J7

Table J7: Summary of the budget

Component	Description	To be implemented by	Amount (Rs)
A	Mitigation / Enhancement	Contractor	
B	Environmental Monitoring		
Subtotal			
C	Training and mobilization	FOEP project management unit	

D	Meeting		

In order to ensure effective implementation of safeguard related components in the project PIU at FOE will include a safeguard expert (an environmental cum social expert) in the team. This safeguard expert will ensure compliance with ESMP and IEE requirements, and implementation at the site through the contractor.

K. Public Consultation (PCM)

40. The following are the major points of concern of the participants of PCM

- Need to obtain the relevant clearances through UDA.(refer annex 3) Then they will provide the necessary guidelines to be followed. This is in addition to the Green Building application.
- Need to consult with the Agrarian Services regarding the buffer and discharge of any water on the boundary bordering the paddy lands.
- Need to follow up on the resettlement of the 2 families that will be relocated due to loss of access.

L. Conclusion and Recommendations

41. Conclusion: The IEE study did not find any major incompatibilities with the surrounding physical, biological, socio-economic or cultural environment. Only issue of concern was the loss of access to 2 households outside of the premises. This is currently being resolved. With the establishment of the FOE project, it will generate economic and social benefit to the community and the land market value will increase in the area with the influx of people. However, careful planning and design of the new development is necessary to ensure that it does pose any significant long term

environmental or social threat. Most impacts are likely during the construction phase and are expected to be temporary in nature and could be mitigated with proper management and good practices.

42. These impacts can be minimized through specific engineering and management solutions. Environment friendly construction methodology should be incorporated into the project design and the ESMP has been prepared to minimize the overall impacts on the environment during the proposed project civil works. Since the proposed project is unlikely to cause any significant adverse environmental impacts, no further study is required. The GRM and ESMP provide appropriate guidance for suitable environmental and social safeguards. Accordingly, the proposed project can be recommended for implementation with strict adherence to ESMP and GRM provided in this IEE.

43. Recommendations: The ESMP and associated UDA,CEA, Homagama Divisional Secretariat guidelines should be followed during construction and operation phases of the project. The detailed engineering design of the building should consider the geotechnical report and propose migratory measures that ensures strong foundation. The land is prone to soil erosion and measures should be adopted to mitigate the problem before it becomes a social and environmental issue on the 40 acre agrarian system on the Western boundary of the project. Therefore, immediately consult the Department of Agrarian Services Development on the USJP FOE reservation limits and applicable regulations prior to construction and development of the land.

44. FOE of UOSJP with consultation of the Homagama Pradesha Saba, should ensure that the solid waste is disposed properly. At the onset of the project, consult the Homagama Pradesha Saba and come to agreement on disposal of solid waste. Under no circumstances should the waste water from the FOE UOSJP be disposed to the surrounding environment without proper treatment. Therefore, a waste water treatment plant should be established within the premises considering the future development associated within the area since it would be a rapidly urbanizing with the current development.

1 INTRODUCTION

1.1 Project Background

45. In Sri Lanka, the service sector, financial activities, transportation and real estate activities have shown a significant year to year (YOY) growth together with activities such as Engineering study, In the engineering services sector, related activities has grown significantly by 66.9% YOY in Colombo District in 2017(Department of Census and statistics). Successive governments in Sri Lanka have promoted the concept of a 'knowledge based economy', particularly during the past two decades[1,2]

46. The International Labour Organisation publication titled 'The Skills gap in four industrial sectors in Sri Lanka' has identified major skills mismatches especially in the high-skill job categories in the Engineering, ICT, tourism & hospitality, construction and light engineering industries[3].The Faculty of Engineering of the University of Sri Jayewardenepura was established in 8th of January 2016 to make a significant contribution to meet the human resource needs of Sri Lanka. The FOE has introduced latest teaching and learning methodologies to its undergraduate students. Currently FOE lacks infrastructure to arrange the lectures and the practical laboratory sessions within the available limited space. They have secured a temporary facility in Rathmalana which does not have proper laboratory facilities or air conditioned space to conduct the academic activities. As a result the faculty runs academic constrains in conducting practices and lectures as they need to train a large number of students in limited space without adequate facilities.

47. Government of Sri Lanka with loan funding from Asian Development Bank (ADB) has proposed to implement the Science and Technology and Human Resource Development Project (STHRDP). The Ministry of Higher Education (MOHE) shall be the Implementing Agency and the University Grant Commission shall be the executing agency for the Project.

48. This project aims to increase the technology oriented work force which will contribute to transform Sri Lankans growing economy. Under this project the University of Sri

[1] Mahinda Chinthana, 2005, Government of Sri Lanka
[2] An Empowered Sri Lanka, 2016, Government of Sri Lanka
[3] The skills gap in four industrial sectors in Sri Lanka, 2015, International Labour Organisation

Jayewardenepura (UOSJP) will build a new Faculty of Engineering (FOE) in Homagama. This will be referred to as the project in this report.

49. The safeguards screening for UOSJP has been completed by the consultants mobilized under TA8235 with recommendation to resolve the involuntary resettlement of two families is prposed. In pursuance of the above, Total Management Solutions Company (Pvt.) Ltd (TMS) was appointed as consultants by ADB to carry out the IEEs and provide environmental safeguards services for Human Resource Development Project. Therefore, TMS will carry out the IEE for FOE project which will implemented by the UOSJP.

50. The proposed feasibility study and the detailed designs of the FOE at UOSJP includes the following:

51. Phase I of the project will involve the construction of the 04 story Welfair and Recreation division (3225 sqm^2) , 4 storied administration building (6875m^2), 03 story IS Department (4245 m^2), 06 story Civil Engineering Department (6225 m^2), 06 story Computer Engineering Department (4735 m^2), 04 storied Electrical and Electronic Engineering Department (5475 m^2) and 04 story Mechanical Engineering Department (4625 m^2). The total building area is 30,420 square meters.

52. Four undergraduate courses are introduced at the FOE, UOSJP. The four fields of engineering will lead to the award of the degree in 'Bachelor of Science Engineering'. The four fields of engineering covered are Civil Engineering, Computer Engineering, Electrical and Electronic Engineering, and Mechanical Engineering.

53. The degree program consists of eight (8) semesters of study, of which the first two (2) semesters (first year) will be common to all students. The selection of students for the four specializations in engineering will commence from the third semester (second year of study) and will be based on the individual preference and performance of the student during the first year.

54. The academic staff is recruited by following the procedures set by the UGC. Initially at the formation of the faculty, four senior lecturers with PhDs in various engineering disciplines were recruited. At present the total number of academic staff is 14 having PhDs and Master Qualifications in Engineering. The projected academic staff requirement is given in Annexure 4.

Table 1: Project intake number of students of Faculty of Engineering UOSJP

Project intake number of students of Faculty of Engineering University of Sri Jayawardhanepura						
	Degree Program	**2018**	**2019**	**2020**	**2021**	**2022**
Bachelors Students	Civil Engineering	30	30	40	50	75
	Computer Engineering	30	30	40	50	75
	Electrical & Electronic	30	30	40	50	75
	Mechanical Engineering	30	30	40	50	75
	Total	**120**	**120**	**160**	**200**	**300**
Post Graduate Students	Civil Engineering	0	2	2	4	7
	Computer Engineering	0	2	2	4	7
	Electrical & Electronic	0	2	2	4	7
	Mechanical Engineering	0	2	2	4	7
	Interdisciplinary Studies	0	1	2	3	4
	Total	**0**	**9**	**10**	**19**	**32**

55. The FOE will train graduates who are ready for industries such as ICT, manufacturing, electrical, electronic, and civil engineering services. This will ensure that these graduates will have a competitive edge to secure jobs both locally and internationally.

1.2 Objectives of the IEE

56. The objectives of the Environmental Study are to:

I. Determine the category of the project depending proposal, environmental sensitivity and magnitude of impacts, i.e. screening as per Government of Sri Lanka's regulations and ADB's Safeguard Policy Statement 2009;

II. Determine the appropriate extent and type of EA required (IEE or EIA), i.e. scoping;

III. Determine the requirement of statutory clearances;

IV. Provide a baseline environmental monitoring and survey; on biodiversity, biophysical resources

V. Predict impacts on relevant environmental attributes and mitigation measures to minimize the impacts; and

VI. Prepare IEE Report including ESMP

57. Recommendations will be provided for mitigating any negative impacts wherever possible through the ESMP. The ESMP will include the recommended institutional arrangements for monitoring activities for identified environmental issues. The IEE will address current physical, ecological, economic and social background of the project anticipated environmental impacts that will arise due to project activities, necessary measures that have to be adopted to mitigate them and public views and suggestions regarding the project.

58. Accordingly, a single consolidated IEE report will be submitted to ADB and also be made available to the PP to facilitate their decision making.

1.3 Approach and Methodology

59. The IEE has been carried out within the existing policy, legal and administrative framework considering the applicable environmental legislation, regulations & guidelines of ADB and MOMDE.

60. **Reconnaissance Survey:** A reconnaissance survey was carried out identify the value environmental components surrounding the project. Location of environmentally protected areas; surface water bodies; environmentally sensitive receptors (educational institutions, religious structures, medical facilities etc.) at the project site was identified during the survey. The Consultant conducted preliminary analysis of the nature, scale and magnitude of the impacts that the project is likely to cause on the environment, especially on the identified Valued Environment Component (VECs). REA, IP and IR checklists (refer Annex 5) were filled out and the findings

incorporated in the preparation of the IEE. Site inspection of proposed project was carried out on 28th of September 2017 (refer Annex 06 for details).

61. Another study will be carried out to analyze and identify the demand for engineering graduates in the labor market to justify the public investment in the technology education and on proposed FOE project. This will be carried out by ADB Separately.

62. **Data Collection & Review:** Secondary data such as Survey of Sri Lanka Topo Sheets, District Planning Maps, Reports etc. have been collected from various secondary sources. Further, secondary data, which are relevant to understand the baseline as pertaining to physical and biological environments has been collected and reviewed. Applicable environmental legislation, regulations & guidelines of ADB and Ministry of Mahaweli Development and Environment (MOMDE).

63. **Environmental Screening & Scoping:** Screening has been conducted with specific consideration such as location of the project with respect soil erosion and land settlement issues to be studied in detail to provide an important feedback to the design / technical team. It will help to modify the designs at locations where impacts can be avoided and incorporate mitigation measures wherever the impacts were unavoidable due to other constraints.

64. **Baseline Environmental Monitoring:** To establish the baseline environmental status, monitoring was carried out for various environmental parameters such as meteorology, ambient air quality, ambient noise level, ground & surface water quality and soil quality[4] at the project site secondary data was referred from numerous reports. No rapid biodiversity assessment was carried out to assess the importance of the biodiversity surrounding the project site as it was an already developed land. However, secondary data such as scientific papers published for project associated area was reviewed. The project site slopes towards the southern boundary where the agrarian canal is located. Therefore infilling and land preparation will be important. It is recommended to consult the Department of Agrarian Services on development and reservation limits of the southern boundary and develop soil control measures prior to construction. At the time of this IEE geotechnical report made available, therefore it is

[4] Soil report for the site

recommended recommendations in the geotechnical report that since the bedrock is highly weathered to consider a shallow type off a foundation structure when finalizing the layout of the master plan. USJP is in the process of developing their Master Plan.

65. **Stakeholder Consultation:** The Faculty also conducts Industrial Consultative Sessions in order to ensure that the curriculum and the delivery of the engineering programme is in line with the requirements of the industry. At the onset of the site investigation on 28th September 2017 an informal consolation was done with the two resident adjoining the eastern boundary who requested an access road from the university premises. The matter was brought to the discussion table and offered them a resettlement plan so that no issues will arise.

66. Consultations on environmental issues have been carried out with relevant stakeholders identified through stakeholder analysis. Such consultations were done with the officials and staff of UOSJP, Department of Agrarian Services and Development, Divisional Engineer water supply, Kottawa, Grama Niladari Kirigampamunuwa and immediate neighbors from the adjoining properties. .A stakeholder consultation was held with representatives from government sector such as UOSJP staff and students, Homagama Pradeshya Saba, Homagama divisional secretary, UDA, Ministry of Megapolis and Western Development, the community surrounding the project site, on the 17th of May 2018 at UOSJP (refer Annex 07, for details).

67. Analysis **of Alternatives:** The environmental analysis of alternatives mainly focuses on location, building design if any, sources of designs from an environmental management perspective to reduce environmental pollution.

68. **Prediction of Impacts & Mitigation Measures:** Based on the above study potential positive and negative impacts on land environment, air environment, noise environment, water environment and biological environment has been assessed for both construction and operation phase. For each impact predicted, feasible and cost effective mitigation measures has been suggested to reduce potentially significant adverse environmental impacts to acceptable levels.

69. **Environment Management Plan:** The ESMP (Part III) has been prepared as per the requirements of ADB safeguard policy statement. The ESMP includes management of

borrow areas, quarries, construction camp; rain water harvesting, storm water management practices; enhancement plan for water body; requirement of noise barrier, establishment of a waste water treatment plant & solid waste management plan, capacity building & training; environmental supervision, monitoring & auditing requirements; etc. At the same time, information was collected to prepare a Basic Information Questionnaire (BIQ) for environment clearance from CEA (refer Annex 08).

1.4 Structure of IEE Report

70. In order to fully meet all requirements, the IEE report generally follows the ADB Safeguard Policy Statement 2009 and EA Guidelines 2003. Structure of the IEE report is organized as follows:

Part 1. IEE Report

Executive Summary

Chapter 1- Introduction

Chapter 2-Policy, Legal, and Administrative Framework

Chapter 3-Description of the Project

Chapter 4-Description of the Environment (Baseline Data)

Chapter 5-Analysis of Alternatives

Chapter 6-Anticipated Environmental Impacts and Mitigation Measures

Chapter 7-Public Consultation

Chapter 8-Environmental Management Plan

Chapter 9-Conclusion and Recommendation

Part II. Annexes

Part III. ESMP

2 DESCRIPTION OF THE PROJECT

2.1 Project Location

71. The proposed construction of the new Faculty of FOE is located in Homagama - Maththegoda, Colombo District, Western Province, Sri Lanka. The project site (i.e. land) is located alongside the Kottawa – Polgasowita Road and is within 2 km of Kottawa town. The land was originally a coconut land which was developed by Prime Land (Pvt) Ltd for residential purpose. This was later acquired by UOSJP for FOE. Annex 9 provides the relevant documents such as the Sri Lankan Government Gazette notification 2033/33 of 23 September 2017 are included. The Sri Lankan Government granted the university with 4.0469 hectare land located in Kakunagawatte, 587 Maththegoda village, Homagama, Pradeshiya Saba limits (Annex 10). Adjoining properties on the western and the northern boundaries are privately owned by Prime Land (Pvt) Ltd. These lands are sold by Prime Land (Pvt) Ltd for residential purpose after clearing.

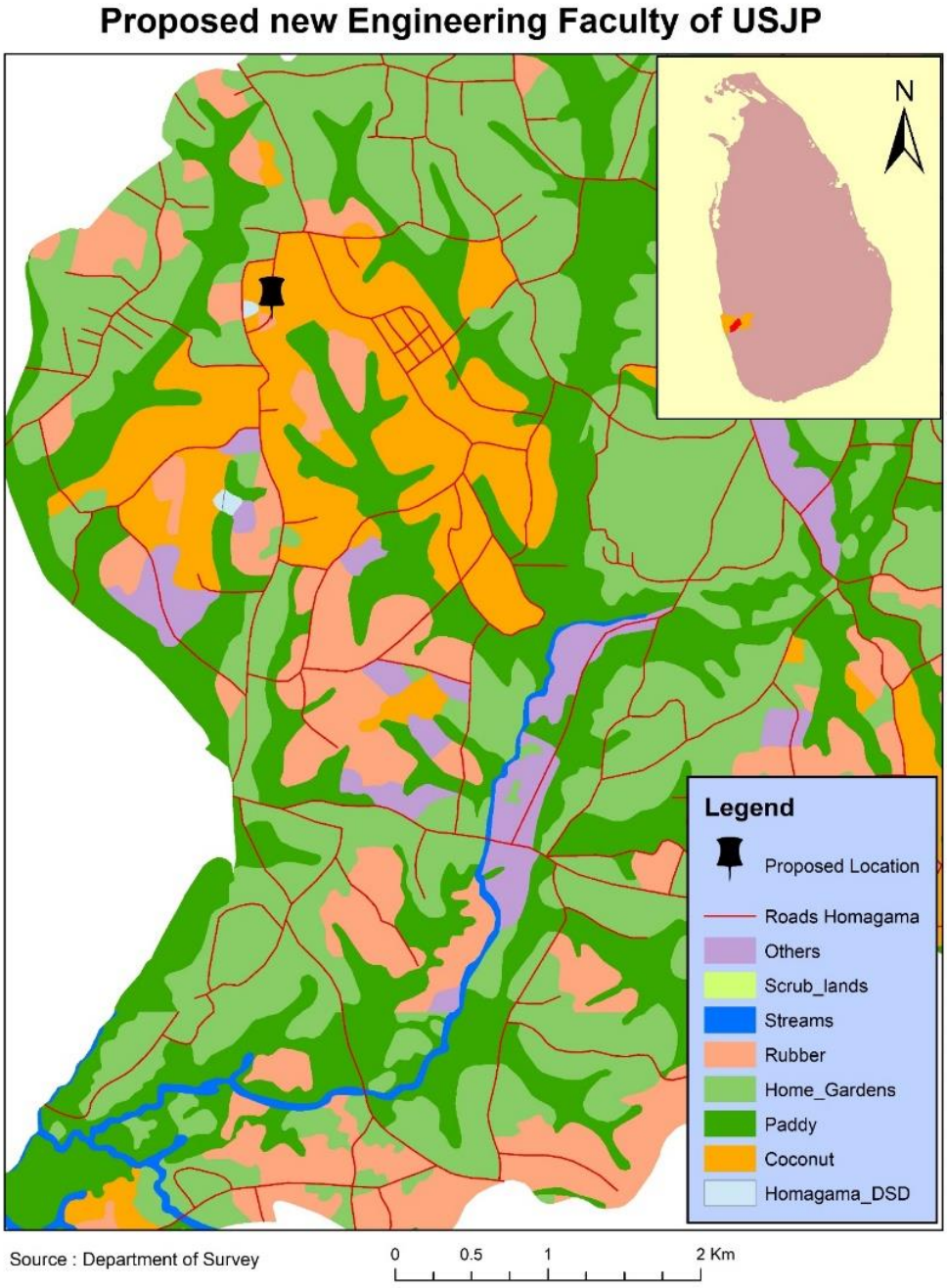
72. The proposed project site is located 7.43 km from the USJP main campus building in Gangodaawila Nugegoda. The land location points are 6°49'26.1"N+79°58'04.7"E. The land is rectangular in shape. There are no permanent or temporary structures on the site it has been cleared by Prime Land (Pvt) Ltd. Since the site has been lying vacant and unused, small shrubs have grown over time. Some photos of the site are shown in Figures 3.

73. On the Northern boundary lies the Kottawa – Polgasowita Road, on the eastern boundary lies Kakunagahawatte and southern boundary supports a canal and Delgahawatte land, while the western boundary adjoins the Lot B a residential developed lands by the land developer. These details are shown in the attached site survey plan (Annex 10). Ali Dena Temple is located 40.23m to the site.

74. The project associated area is rural and residential. Under Ministry of Megapolis and Western Development this area was zoned for residential development. However, the decision was reversed based on the national need to establish a FOE at UOSJP. The letter granting such approval is provided in Annex 11. Figure 2 provides the zonation map for location.

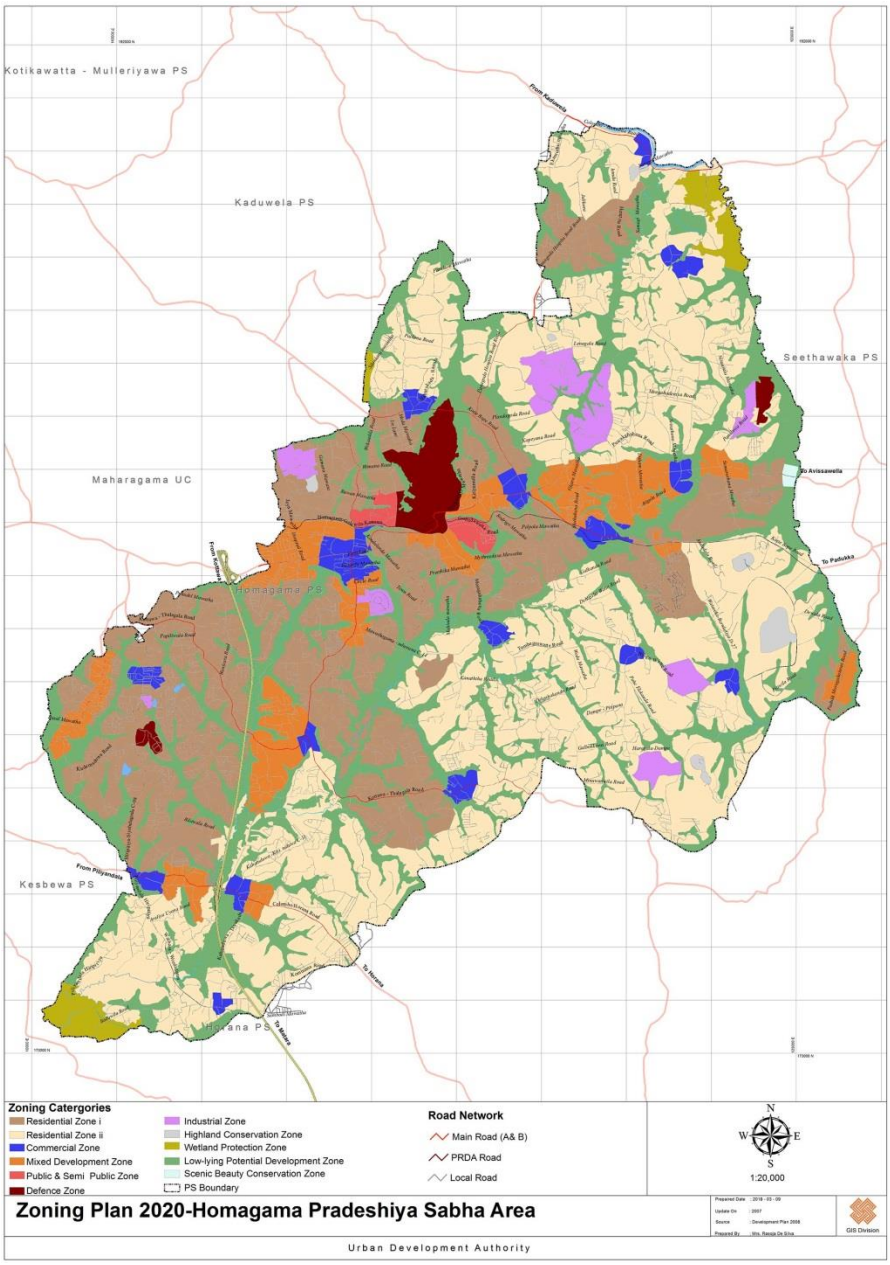
75. At the time of the site inspection, no onsite work was initiated and the land was cleared. The Homagama Divisional Secretariat has granted permission to UOSJP to continue with the proposed development (Annex 12).

Figure 1: Location of project site



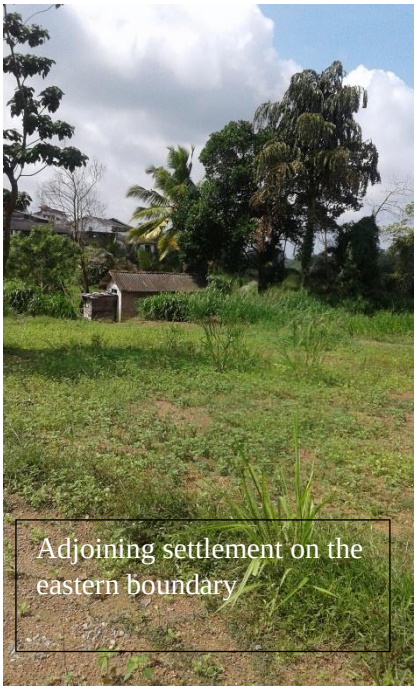
Source: Prepared by TMS

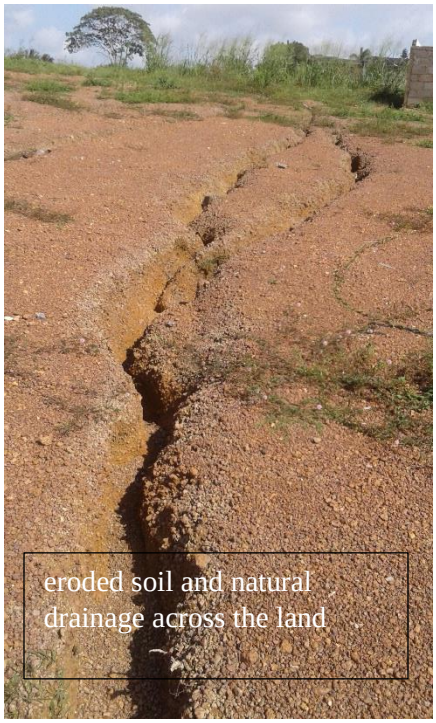
Figure 2: UDA zonation map for the site



Source: http://www.uda.gov.lk/img/development/Homagama_Zoning-Final_Corrected.jpg

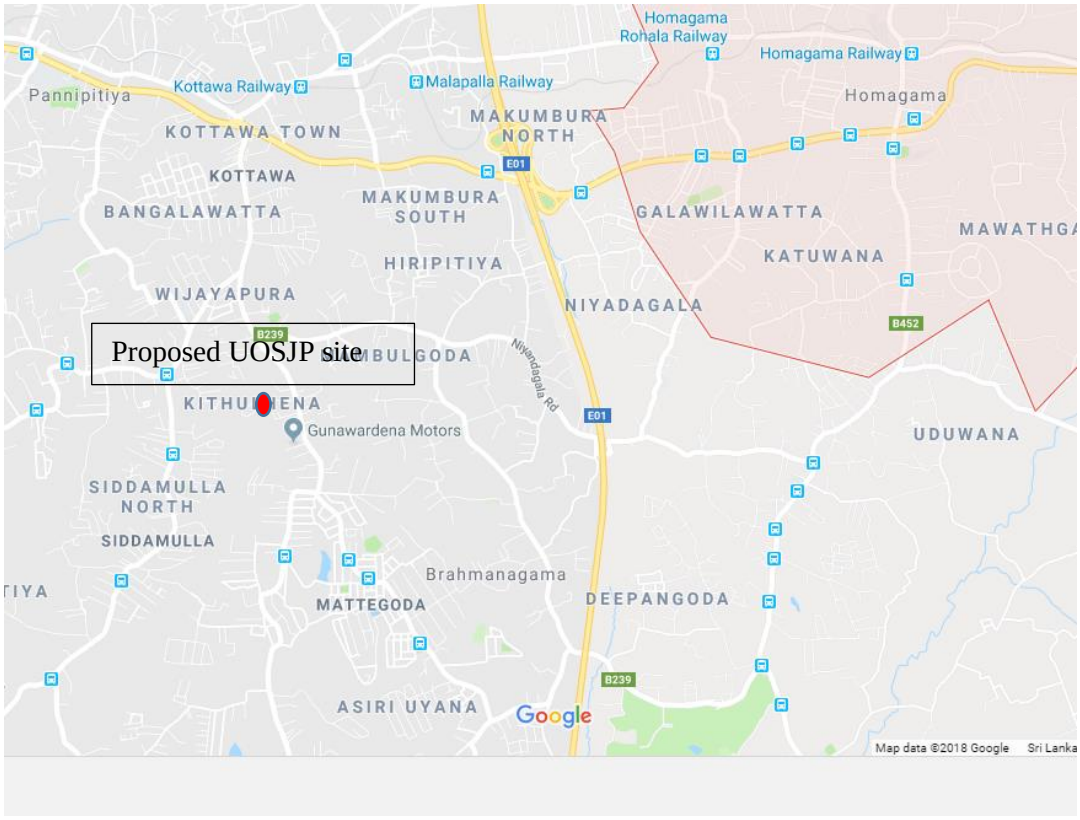
Figure 3: Pictures of project associate site





Source: Captured by TMS

Figure 4: Proposed project vicinity plan:



2.2 Description of the Project

76. The proposed FOE project will involve construction of a new faculty with facilities to conduct lectures for engineering students. The FOE will consist of several buildings The FOE will be with several storied buildings and will be constructed in two phases.

77. The proposed FOE is composed of 04 storied Mechanical Engineering Department building (4625m^2), 04 storied Electrical and Electronic Department building (5475 m^2), 06 storied Computer Engineering Department building (4375m^2), 06 storied Civil Engineering Department building (6225m^2), 03 storied IS Department building (4245 m^2), 04 storied Welfare and Recreation building (3225), and a 04 storied Administrative Division building (6875 m^2). Altogether after the completion of phase I and II would establish 5 buildings in the FOE complex. It will include 12 laboratories for mechanical engineering, 15 laboratories for electrical and electronic engineering,12 laboratories for computer engineering. 13 laboratories for civil engineering and one laboratory for IS department. The details design and the lay out

plan for the FOE is provided in Figure 5 (Refer Master plan and preliminary design plan for FOE Map Annex 13). The project will be implanted in two stages that is Phase I and Phase II. Most of the laboratories will be built in the phase I whereas the high voltage lab and construction lab will be built under additional funding mechanism and is planned for Phase II. The Phase I of the FOE will be funded by ADB.

78. Once the detail designs are conceptualized it would include CCTV system, data and telephone system, lighting protection system, air condition systems and drainage systems, solid waste management room (200m^2) will be installed. However the design has not considered space for a waste water management plant or Rain water harvesting system in their draft lay out plan.

79. The layout plan of FOE of UOSJP is shown below in Figure 5. The site plans and 3D views have been shown in Figure 6.

Figure 5: layout Plan of the FOE of USJP and

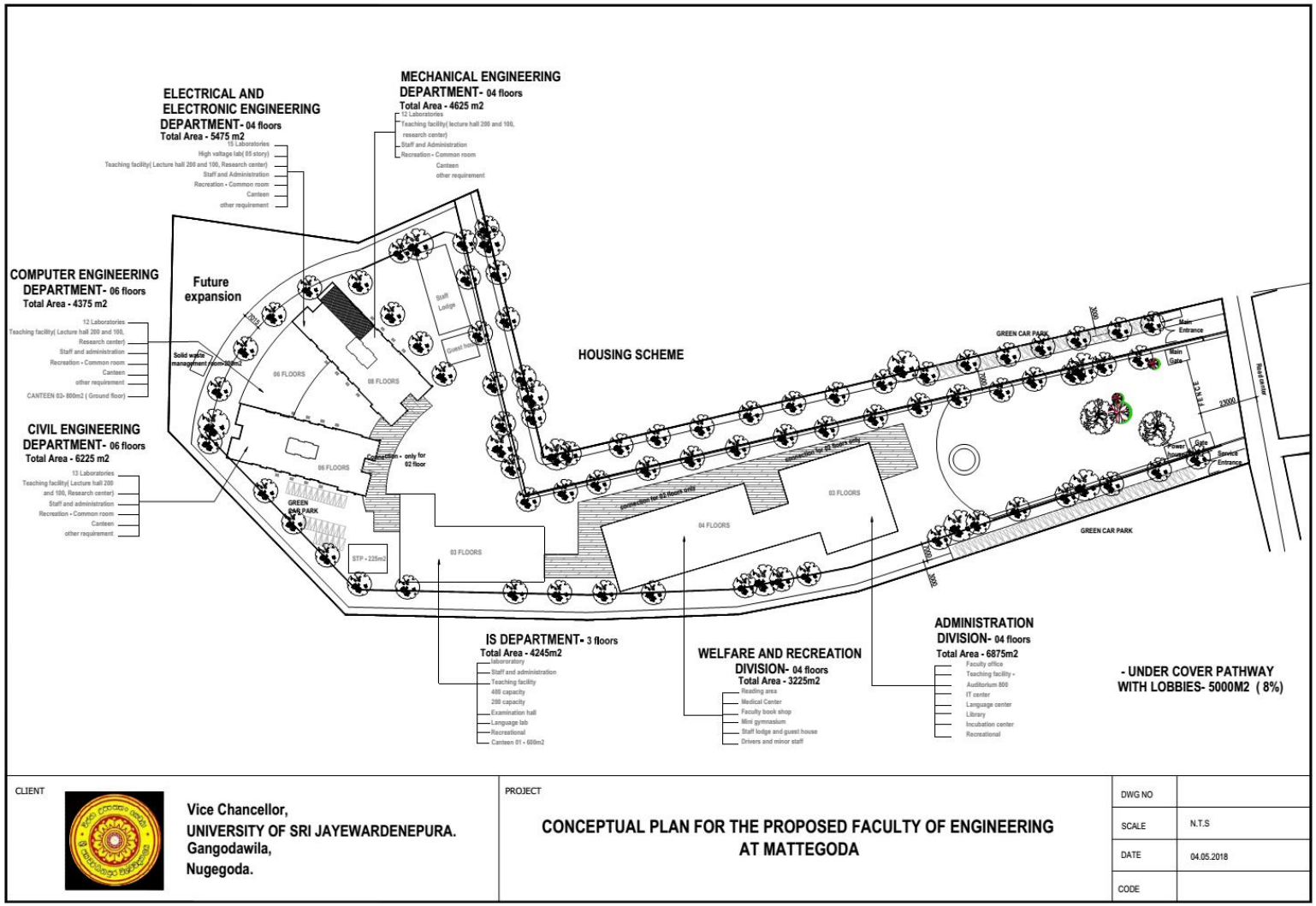
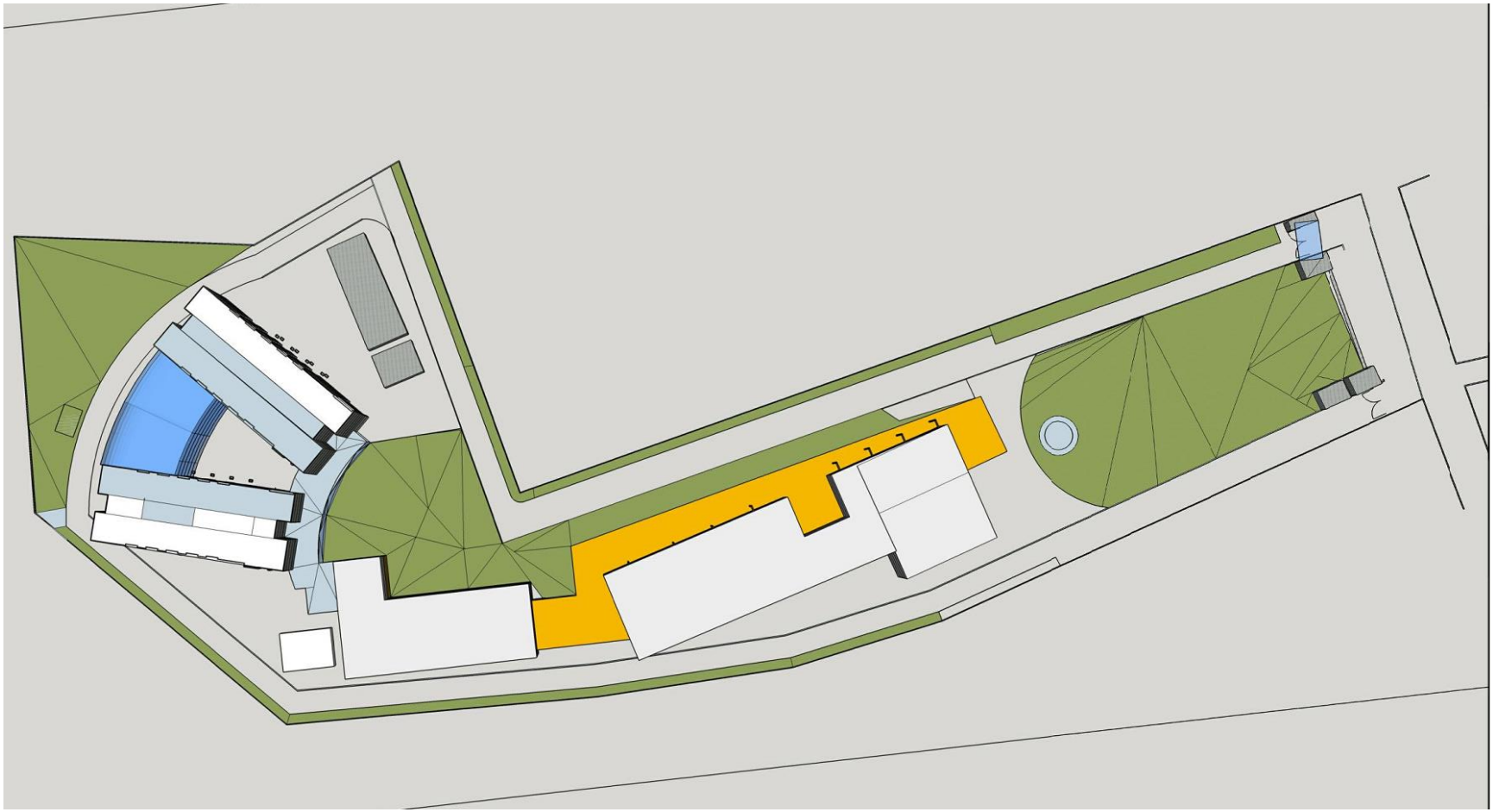


Figure 6: Conceptual 3D view of the FOE building USJP



80. The wastewater that is generated from the facility will need to be directed to a treatment plant and then released for irrigation within premises. The building structure will be designed on a soft foundation and beam with Alume Zinc roofing (marine quality) all doors and windows will be powder coated aluminum. Other design considerations include fire safety, air conditioning, septic tank for collection of waste water and sewage, and landscaping.

81. **Culvert:** There should be a culvert across the land to discharge the water from the adjoining land owned by Prime land the property developer . Considering the hydrological and design requirement, some additional culverts and relocation of the would have to be proposed for the project.

82. **Road side drain**: Roadside drains shall generally be provided on both sides of the Embankment to safely carry the discharge from the embankment without eroding the pavements.

83. **Utilities**: To facilitate utilities to the FOE which may include electric lines and poles, fiber optics, waterlines, etc., sufficient space should be provided on both sides of the access road. The size of pipes to carry utilities will be based on FOE occupancy size and utilities needed.

84. **Land Acquisition:** UOSJP has secured adequate land to build the faculty. Project will be built on 10 acre land which is owned by UOSJP. The land has been acquired by the government to the University. The strategic location of this faculty will enhance the opportunity for students to carry out their academic and practical assignments while will befit the regional development.

85. **Demand analysis study:** Detailed analysis on demand for graduate students will be carried out to justify the public investment for the FOE project will be carried out as a separate assignment by ADB. It will analyze and identify the demand for technology graduates in the labor market to justify the public investment in the technology education and on proposed FOE project.

86. **FOE improvement proposal** FOE, UOSJP primary objective aims to produce exceptional graduates who will have the capacity to outstand among other engineering undergraduates and to contribute towards national and regional economy through academic, industrial, research and development. It is also envisaged to harness the

strengths of other Faculties such as faculty of management studies so that the FOE student is instilled with muti disciplinary special skills.

87. UOSJP is planning to introduce result oriented staff and student recognition and awarding system that will ensure continuous improvement in the system. The Faculty has also signed MoUs with academic and industrial partners in order to conduct research and development work that has a high commercial value. FOE has obtained services of consultants to provide critical assessment of the curriculum and conforms to national and international standards for higher education in engineering The Faculty plans to establish an innovation and incubation center that will be mutually beneficial to both university and Industry

88. The FOE at the UOSJP has conducted Industrial Consultative Sessions as a Faculty to review the curriculum and access the delivery of the programme and check whether it is in line with the requirements of the industry During the FOE curricular development, course modules were developed with the participation of 150 academics and professionals in engineering and other related fields. FOE has developed a curriculum for the degree programmes that analyzed the market demand and trends. It is planned to develop minor areas of specialization depending on the global requirements and changes in the country.

89. The university is planning to introduce an advanced ,management information system integrating all the academic, administrative, research, teaching and learning activities

90. **FOE improvement proposal:** There will be more reforms within the FOE includes the following

- Make the curricula flexible by introducing different entry and exit points
- Motivate students to obtain foreign exposure as part of degree programmes
- Encourage research-lead teaching and learning practices
- Introduce multidisciplinary and inter-disciplinary courses and programs
- Introduce student centered learning methods to facilitate independent and active learning
- Apply modern technologies in teaching and learning enabling the staff to work with state-of-the art technologies.
- Enable students to learn by research activities and exchanging knowledge.

- Work closely with professional bodies, industry, alumni and other stakeholders to ensure the degree programs are responsive to current needs
- Reward system: this include motivate the staff by clearly linking individuals' goals to organizational goals
- Upgrade the quality and relevance of programs through internal quality assurance framework and international accreditation.
- Introduce codes of conduct and best practices for teaching and learning
- Formulate a sound research agenda by exploring new and emerging areas of research beyond traditional boundaries.
- Publish, popularize, commercialize and apply generated knowledge through research and innovation
- Enhance the involvement of students in research and publications.

91. **Development of infrastructure**: The FOE would involves the construction of 12 laboratories for mechanical engineering,15 laboratories for electrical and electronic engineering,12 laboratories for computer engineering. 13 laboratories for civil engineering. These laboratories will be constructed using state of the art technology that will attract higher student population. Most modern infrastructure constructed and procured for the project will ensure more industrial linkages with applicable research conducted. With the competition of the FOE in migration of academics and students will increase the residential development in the region. This would improve the regional road network, utility services that serves the FOE. Establishment of a student crossing at the Kottawa – Polgasowita Road. Indirectly service sector small business will voluntarily will mushroom as a result of this development.

92. **Building safety design and devices**: The building must have built-in alternative emergency evacuation routes for speedy evacuation of occupants during an emergency. In case of a major fire, the building components should withstand the fire for a nominated time period without a catastrophic failure occurring until all occupants safely vacate the building. Fire Precautions for Buildings: During the building design the Code of Fire Precautions for Buildings would have to be applied i.e. ICTAD Publication No. ICTAD/DEV/14 that deals with the regulations on fire prevention in a building. There are many more periodic maintenance requirements to be fulfilled to

ensure structural integrity, user safety and internal hygienic environment of the building. Apart from the above the manual on 'Energy Savings in Buildings' developed by Sri Lanka Sustainable Energy Authority and the Construction Material Specifications developed by the former Institute for Construction and Development should be referred.

93. The building should have fire safety mechanisms installed to ensure fire compartments, separation and fire suppression. The portable and built-in fire-fighting equipment and apparatus must be in place at correct locations and at optimal operational levels for the fire brigade to control the fire.

94. **Borrow Areas:** Potential sources of earth for the construction of embankment and soil infilling needs to be identified by the consultant design engineers and the contractors for the project and the access road to FOE. The suitability of borrow materials can be checked by laboratory tests such as proctor compaction test, gradation test, liquid limit plastic limit etc

95. **Fine Aggregate Material:** Local enquiry suggests that extraction / mining of natural sand is banned in Kalu, Kalni rivers in the western province. It is therefore suggested to use sea sand which can be obtained from the SLLRDC sand depositary for the site.

96. **Cement**: Local and imported cement in bag or bulk form is available for construction. Cement shall conform to SLS 107 for building

97. **Cement block & clay bricks**: these should be tested according to SLS 847 and SLS 39 for compressive strength, dimensions and water absorption

98. **Steel**: High strength deformed bars manufactured by various steel manufacturing companies conforming to SLS standards are available. Before incorporation into the work, steel should be approved by the Engineer

99. **Quality Control of Earth Work**: This includes excavation, filling and leveling of the earth work. The failure of quality control of earth works in building construction sites would lead to ground subsidence, cracks and structural failure in a part of or whole building .To minimize the delay during progress of earth filling work, it is necessary to select borrow materials well in advance to the earth filling work because it will take a considerable time duration for selecting, testing, obtaining approval etc. of borrow materials

100. According to the site condition, it is necessary to select suitable machines for spreading, leveling and compaction. The capacity of the machine and size of the blade are important factors for selection. After completion of each layer of compaction, dry density has to be checked as specified in the specifications. The failures of earth compaction compliance with the specifications may cause future settlements, erosions or subsidence.

Table 2: Project cost and procurement plan as estimates

COST ESTIMATES AND PROCUREMENT PLAN		
Assignment Description	**Cost estimate (USD)**	
	ADB	**Gov't**
Infrastructure	21623429.49	7703557.692
Human Resource (Capacity Building & Development)	128205.1282	0
Equipment	7884615.385	1201923.077
Operation and Maintenance		432692.3077
Project Administration	210000	0
Grand Total	29846250	9338173.077

102. **Cost of the Project** : The total cost estimated for major items associated with the proposed project (including earth work, pavement, drainage structures and construction of buildings) have been established by application of appropriate unit rates to the estimated work item quantities derived from the results of surveys, test results and design analysis for the project. The estimated civil work and design cost for phases I and II is 3,134.255 million. Refer table 2

3 POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

3.1 Applicable Measurable Environmental legislations

103. In Sri Lanka, there are over 70 laws that directly or indirectly relate to protecting and conserving the natural environment and human health. While most of these laws address specific issues pertaining to environment in the respective sector, it was the introduction and enactment of the National Environmental Act (NEA) that provided the overarching legal basis for regulation of pollution and protection of the environment in a comprehensive manner.

104. The following section outlines the broad legal and institutional framework in Sri Lanka for environmental management, relevant to the proposed project. The legislations relevant to the project are listed below. Further details are provided in Annex 14. This project comes under the purview of the following sector level Acts. The EPL procedure under the CEA is explained in Annex 14 along with the rest of the laws that are listed below

a) The Constitution of Sri Lanka (Articles 18, 27(14), Articles 154 (A), 9, 19 and (III) 17)

b) National Environmental Act No. 47 of 1980 (and its amendments of 1988) EIA is covered under this Act

c) Disaster Management Act No. 13 of 2005

d) Pradeshiya Sabha Act No. 15 of 1987

e) Flood Protection Ordinance, Act No. 22 of 1955

f) Sri Lanka Land Reclamation and Development Corporation Act No 15 of 1968

g) State Land Ordinance, Act No. 13 of 1949

h) Soil Conservation Act, No. 25 of 1951

i) Mines and Minerals Act No. 33 of 1992

j) Fauna and Flora Protection Ordinance, Act No. 49 of 1983

k) Forest Ordinance, No 17 of 1907 (and amendments)

l) National Water Supply and Drainage Board Law of No. 2 of 1974

m)National Policy for Rural Water Supply and Sanitation of 2001

n) Prevention of Mosquito Breeding, Act No. 11 of 2007

o) The Urban Development Authority, Law, No 41 of 1978

p) Municipal Council Ordinances and Acts – Urban Council Ordinance 61 of 1939, Act 29 of 1947, Act 18 of 1979, and Act 13 of 1979

q) Land Acquisition Act No. 09 in 1950 and subsequent amendments in 1983 1nd 1986 Land Acquisition Regulations of 2008

r) National Environmental (Amendment) Act 47 of 1980 and its amendments

105. This is the law that incorporates and covers all aspects of the environment in Sri Lanka. The National Environmental Act (NEA) No. 47 of 1980 is the basic national decree for protection and management of the environment. The NEA has gone through several amendments in the past in a bid to continually improve and to respond to the challenging conditions. There are two main regulatory provisions under the NEA which is implemented by the Central Environmental Authority (CEA).

106. The Environmental Impact Assessment (EIA) procedure for major development projects has been published in 1993 and is available with the CEA. The EIA process is implemented through designated Project Approving Agencies (PAAs). The screening, scoping, formulation of initial environmental examination (IEE), environmental management plan (EMP) and procedures for IEE and EMP disclosure and public

comments will be governed by NEA of 1980 and its subsequent amendments of 1988 and 2000, and by environmental regulations. Under the national regulations, the current development project of the FOE does not require an IEE because it is not within a designated protected area.

107. The Environmental Protection License (EPL) is a procedure for the control of pollution. Regulations pertaining to this process have been published in 1990 and are available with the CEA EPL is issued on the regulations are gazette under Gazette Extraordinary No. 1533/16 dated January 25,2008, for a variety of sectors involving in manufacturing, construction and services.

108. **Conclusion**: Under local legislation, an IEE is not required as the development is categorized in the "un - prescribed projects. However, CEAs consent for the projects under non-prescribed category has not been obtained The process would have to be initiated for a EPL

109. National laws and regulations that can be relevant to the project are briefly described in Table10. Details on these applicable laws are covered in Annex 14.

110. **ADB Safeguard Policy Statement, 2009.** The Asian Development Bank has defined its Safeguard requirements under its 'Safeguard Policy Statement 2009 (SPS 2009). The prime objectives of safeguard policy are to: (i) avoid adverse impacts of projects on the environment and affected people, where possible; and (ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment. And affected people when avoidance is not possible. This policy requires assessment, mitigation and commitment towards environmental protection. The extent of assessment depends on the category of the project. ADB's SPS 2009 classify a project depending on following three categories.

111. Category A: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An Environmental Impact Assessment is required.

112. Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, none or very few of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An Initial Environmental Examination is required.

113. Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

114. **Conclusion**: The proposed project cause environmental impacts which are less adverse in nature and few of them are reversible and mitigation measures can be designed more readily for the identified impacts. To assess the impact the REA, IP and IR Checklist of ADB was followed As per the ADB's Safeguard Policy Statement the proposed FOE project of USJP has been classified as Category 'B' project requiring Initial Environmental Examination (IEE).

115. It also aims to identify any potential negative environmental or social impacts in the immediate vicinity or surrounding areas that maybe short term or long term. Accordingly a single consolidated IEE report is submitted for ADB to facilitate their decision making Clearances required for the Project.

116. A summary of the statuary clearances required for the FOEP is presented in Table- 3.

Table 3: Statutory Clearances required for the Project

Type of Clearance	Activity	Name of the Authority	When required
Environment Clearance Environmental Protection Licensing) Regulation	Implementation of the project and waste water treatment.	CEA	Before construction

	No. 1533/16of 2008			
	Clearance for development activities	Implementation of the project and construction of the building. They will direct to obtain approval from the Homagama Pradeshiya Saba and CEA	UDA	Before construction
	Local Government Authorities building approval	The Municipal Councils, Urban Councils and Pradeshiya Sabhas share the powers regarding the approval of buildings plans, control of solid waste disposal, sewerage and other public utilities. Under these laws the new construction requires approval. Adhere to building regulation	Local Authority (Homagama Pradeshiya Saba)	Before construction
	Approval for removal of trees on site	Site clearance to have space for the building and to provide aces and material storage	DS	Before construction
	Consent from relevant government agencies	Construction of building and culverts and other drainage systems etc. Requirement of buffer zone and water quality parameters.	Urban Development Authority, CEA, Department of Agrarian Services.	Before construction
	Consent to Ceylon Electricity board	Obtaining the electricity supply for the FOE complex	Ceylon Electricity Board	After completion of the building
	Water Supply	Supply of Potable water for the facility and supply the certification of pumping drainage	NWSDB	After completion of the building

117. Apart from the clearances for

the overall project work, the contractor, before starting the construction work, has to obtain required Clearances s listed in Table-4. for operating his equipment and carrying out construction work.

Table 4: Clearance required to be obtained by the Contractor

No	Construction Activity & Type of Clearance Required	Statutory Authority	Statute Under which Clearance is Required
1	Consent for Establishment of Stone Crushers and Cement Mixing Batching Plant	CEA	National Environmental Act No. 47 of 1980
3	Permission for extraction of sand, metal from soil	Geological Survey and Mines Burea (GSMB)	Geological Survey and Mines Bureau (GSMB) Act No. 33 of 1992
4	Location and layout of workers camp, & equipment and storage yards	Homagama Pradeshiya Saba	Local Government Ordinances and Acts –Urban Council Ordinance 61 of 1939, Act 29 of 1947, Act 18 of 1979, and Act 13 of 1979
5	Discharges from labour camp	Central Environmental Authority (CEA)	National Environmental Act Act No. 47 of 1980 National Environmental (Protection & Quality) Regulations, No. 01 of 1990.
6	Disposal of solid and liquid waste	Central Environmental Authority (CEA)	National Environmental Act No. 47 of 1980
7	Noise and dust pollution during construction activities	CEA	Air (Prevention and Control of Pollution) Act, 1981 National Environmental (Noise Control)Regulations No. 01 of 1996
8	Disposal of spoil material garneted during building and construction	Homagama Pradeshiya Saba	National Environmental Act Act No. 47 of 1980
9	Revenue license for the heavy machinery and other vehicles at the work site	Office of provincial Commissioner for Motor Traffic the vehicle is being registered	Motor traffic Statute of Western Province No 7 of 1991.
10	Engagement of Labour - Labour License	Labour Commissioner	Shop and office Employees Act 1934 Employees' Trust

			Fund Act No 15 of 1980 established the Employees' Trust Fund (ETF). Employees' Provident Fund Act of 1958 Municipal Council Ordinances and Acts – Urban Council Ordinance 61 of 1939, Act 29 of 1947, Act 18 of 1979,
11	Engagement of Labour- • Social Security- • Labour Welfare- • Wages	Labour Commissioner (Ministry of Labour and Employment	The Employees' Provident Fund Act, 1958 & Miscellaneous Provisions 1975 Workmen's Compensation Ordinance of 1935 and subsequent Amendments Shop and Office Employees (Regulation of Employment and Remuneration) Act, 1954 Factories Ordinance, 1942 2010 on fair treatment

118. **Construction and Demolition Waste**: When obtaining permission for building construction, a plan should be made available as to how to dispose the waste that is generated on site.

119. Every waste generator shall be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated separately; deposit at collection centre so made by the local authority.

120. LA shall be responsible for proper management of construction and demolition waste within its jurisdiction including placing appropriate containers for collection of waste, removal at regular intervals, transportation to appropriate sites for processing and disposalp. Table 5provides the Timeframe for Planning & Implementation.

Table 5: Timeframe for Planning & Implementation

Sl. No	Compliance Criteria	Duration
1	Identification of site for collection and processing facility	3 month
2	Commissioning and implementation	5 month
3	Monitoring by PIU	3 times a year

121. Present feasibility and cost for equipment and building of the FOEP at UOSJP were completed in ##########. Bidding document was prepared for FOEP in August 2017 and technical bids will be evaluated by#######. The contracts for the civil works of this project are expected to be awarded by#########.

3.2 Administrative Framework

122. **Central Environmental Authority**: The CEA basically designs the scheme, procedures and standards to control the water, air & noise pollution, land degradation and hazardous substances and waste management.

123. CEA advise the MOERE on matters concerning prevention, control and abatement of water and air pollution; coordinate the activities of CEA & provide technical and research assistance; prepare manual, codes, guidelines & standards etc.

124. University of Sri Jayewardenepura will be required to obtain an environmental recommendation letter or EPL from CEA. The NEA regulations stipulates that canteen facilities which provide seating capacity for over 50 students at a time fall under EPL category B.

125. According to the BIQ, the proposed project falls in to the un-prescribed category. According to the BIQ and IEE/EIA Environmental Guidelines of CEA, the proposed project falls in to the non-prescribed category. Therefore environmental clearance for an IEE will not be required from government of Sri Lanka. CEA consent for the FOE development project under un-prescribed category has to be obtained through a letter. (Annex 08- BIQ has been filled out and ready to be submitted to CEA for environment clearance.)

126. The domestic waste water that will be generated during the operation of the facility will be collected to a septic tank and disposed at regular intervals. Before discharge treated water quality should conform to regulations No. 1534/18 dated 01.02.2008.

127. Coordinate with the Homagama Pradeshiysa Saba on the waste dumpsite. Homagama has been declared as an Urban Development Area‟ under the Urban Development Authority Act No. 41 of 1978 since 1978. (Vide Map No. 18).

128. All land development activities and the blocking out of lands within the administrative area of the Pradeshiya Sabha should be first registered at the Homagama Pradeshiya Sabha (HPS). It regulates land development activities in Homagama urban area (limits were gazzeted in 2009). Thereafter PIU FOE would require to obtain a permit for the construction activities of FOE building complex from the HPS prior to construction.

129. Disposal of solid waste during construction and operation has to be coordinated with the HPS. Removal of untreated waste water of the new FOE premises by using gully bowsers until the proper waste water treatment plant is established. For this purpose initially an application form should be filled in and submitted to Secretary of the HPS. It will be then inspected and fees estimated for the service by the PHI of HPS which would be subjected for approval from the Secretary of the HPS.

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4 DESCRIPTION OF THE ENVIRONMENT

4.1 Methodology used for Baseline Study

130. Data collection and stakeholder consultations. Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed site.

131. The literature survey broadly covered the following;

i. Project details, reports, maps, and other documents prepared by technical experts of the ADB PPTA team and discussions with technical experts of the PIU of UOSJP team, local authorities, relevant government agencies like UDA, CEA, Department of Agrarian Services Development etc.

ii. Secondary data from previous project reports and published articles, and literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from government agencies (including the resource profile for the area) and websites. Several visits to the project sites were made during IEE preparation period between September to May 2018 to assess the existing environment (physical, biological) and gather information with regard to the proposed sites. No separate studies were done on biodiversity at the selected site as it was not deemed necessary.

iii. During the site visit, the REA, IP and IR checklists were filled and the findings incorporated in the IEE. In addition activities such as assessment of the existing location and the surrounding environment identification of sensitive areas, key informant interviews were carried out. Other reliable information was collected from villagers and respective authorities during public consultation meetings.

4.2 Location Area and Connectivity

132. Geographically, the project area is located at latitude 6°49'26.1"N+ and 79°58'04.7"E longitude in the Homagama Pradeshiya Saba limits of Colombo District, Western Province. The Project is located in the Homagama Division that covers an area of 2197.48 ha. Homagama Divisional Secretariat consists of 81 Grama Niladhari divisions. The project area comprises Maththegoda, Kottawa, Homagama and Salgas

Junction. In the Colombo Core Area Plan, Homagama has been categorized as a 4th order township[5].

133. The Polgasowita Road passes near the project site. Homagama Division is one of the main commercial hubs located 19 km away from the Colombo city. Homagama railway station is 4.65 km away from the project site. The project area is 444.30m away from the Salgas Junction served with one bus stop and 635.70m away from the Mattegoda Junction with one bus stop.

134. Homagama is linked to Aviswella, Ratnapura, Badulla, Ampara, Batticaloa through High Level Road and the City of Kandy via Colombo, Hanwella, Pahathgama, Pasyala Road and to the coastal towns of Kalutara, Panadura, viaColombo, Horana, Bandaragama Road. The Kelani Valley Railway Line, running parallel to High Level Road is linked with Avissawella. With the construction of the Southern Highway, Homagama is linked to the Southern region (Galle and Matara Towns).

135. The Science and Technology City is to be built on the Malambe Homagama corridor and it is approximately 9 km away from new FOE. Homagama Technology City project is 8.3 km from the project site. The areas has been demarcated as a satellite residential city which will serve Colombo city under the Megapolis planning process[6].

136. Homagama Division is one of the main commercial hubs located 18 km from the Colombo city. Homagama DSD is one of industrial DSD located close to Colombo[7]. The project area is 2 Km from the Kottawa town served with two bus stops. Project road predominately traverse through plain terrain. Refer Index Map - Figure 7 for location.

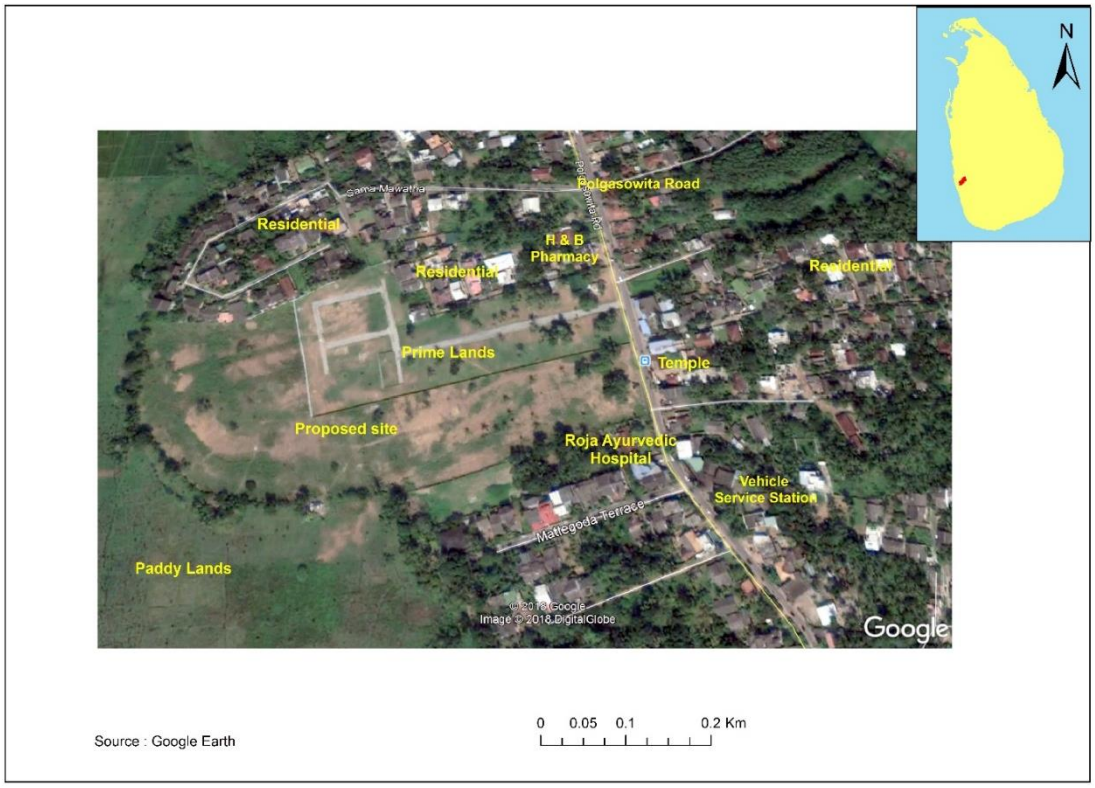
137. In Homagama region opportunities available for further development of national level projects such as universities, industrial parks and service apartment and logistic stations due to close proximity to the interchange of Southern expressway from Kottawa. The daily commuting population is considerably high in Homagama area due to the easy access available from High level road and low level roads. Homagama has

[5] UDA Development plan Homagama
[6] ibid
[7] Megapolis Plan WRMPP 2017. Ministry of Mega polis a and Western Developments

been declared as urban development ,area since 2009 due to its potential for structured growth and planning[8]

138. There are several crucial environmental challenges facing the Hoamgama DSD including improper land use planning, improper waste disposal, water pollution due to urbanization and agricultural activities etc

Figure 7: Map show the location of the project and the surrounding



Source: Prepared by TMS

4.3 Land Use

139. The total land use coverage in Homagama is 11,815.5ha. The land use system of the region is dominated by home gardens (5981.532 ha). The built-up area consists 473.458 ha while paddy lands are is 2427.121ha and other agricultural lands are in 2421.662ha. Table 6 highlights the land use patterns in the DSD.

Before urbanization occurred, Homagama was composed of wetland and paddy land[9]. The land use pattern in the project area today, is urban with predominately mixed development. Project surrounding land can be categorized into built up area

[8] UDA Homagama Development Plan 2009

140. (4%), home gardens (50.62 %) and tanks and reservoirs (0.64%). Land use of the project area consists of private land, state land, residential land, industrial land, and several natural habitats, (paddy lands).

Table 6: Land use Pattern

Land Use	Hectare	As % of the DSD
Developed lands (areas with buildings /Residential areas/ industrial areas/ urban service centers)	473.458	4.00%
Paddy	2427.121	20.54%
Rubber	1632.636	13.81%
Coconut	587.951	4.976%
other field crops	194.541	1.64%
Home garden	5981.532	50.62%
Shrubs / jungles	11.123	0.09%
Tanks / Reservoirs	75.702	0.64%
other lands (lands with rocks / bare lands)	198.527	1.68%
Playgrounds	68.415	0.57%
Total hectare	11815.5	

4.4 Seismicity

141. The project is located in the western province of Sri Lanka which is not an active seismic region. The area does not have any potential risk of damage due to earthquake. However the stability of the bedrock and soil should be considered during building design. The site is partly sloping and rolling terrain[10].

[9] Kaliniya DSD resource profile 2014
[10] Soil Report

4.5 Geology, Soil and Topography

142. The location is in the Homagama Divisional Secretariat which is geologically there are 04 types of soil distribution. 2 types of soil types fall within the red- yellow podzolic soil category. That means the red- yellow podzolic soil is deeper stretched (a deep soil) which can often be sees in mountain slopes and wrinkle lands and soft or hard laterite areas. Except above two soil types, closer to the canals, streams, rivers and marshland areas exhibit bog and half-bog soils and the remaining areas have alluvial soils.

143. Podzolic soil is mostly used for constructions and growing trees and crops. Because of good water drainage in the area, there is a mixed crop of rubber, coconut, and home gardens in the area. Areas which have bog and half-bog soil, serve as environmentally beneficial service areas for flood protection. Alluvial soil is used for paddy cultivation.

144. The site is on a Western Intermediate Erosional Platform and in general the lithography of the terrain is composed of layered metamorphic rock subjected to high grade metamorphism [11]. The maximum slop of the area is 30^0slope horizontal and the terrain is not uniform. But variable from 0^0-30^0.

145. The initial designs of FOE academic building should consider that net allowable carrying capacity of 3.0MN/m^2. The carrying capacity in skin friction within the basement rock or the ultimate skin friction coefficient is 140 kN/m^2, which is above the ICTAD recommended guidelines. Refer the geotechnical soil assessment recommendation (see Annex 2).

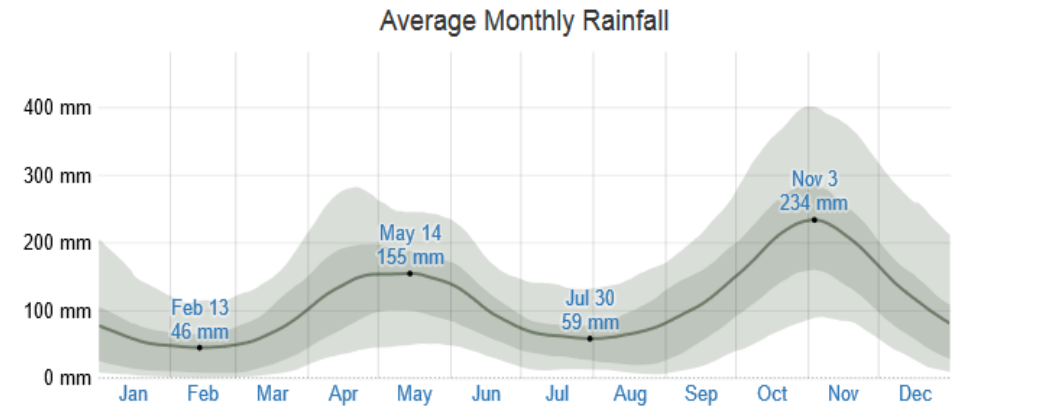
4.6 Climate and Meteorology

146. Climate conditions in the study area: Homagama division lies within the wet zone and according to agro ecological classification, the project area comes under the category of WL3 (Wet Zone Low Country). It experiences a uniform rainfall pattern and receives rainfall from both monsoon periods as well as during inter-monsoon periods (South-West Monsoon from June to September, North-East Monsoon from December to March and in between two inter-monsoon periods of two months each). Rainfall and temperature details of the project area are given in the Figure 8. FOE Project area

[11] ibid

receives highest rainfall (234mm) in the month of November and the lowest (46mm) in the month of February with an average annual rainfall of about 3,030 mm.

Figure 8 : Average monthly precipitation over the year (rainfall) at the project site



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.

Source https://weatherspark.com/

147. Past meteorological data was collected from the nearest Anuradhapura air force station for the period of

Parameters	Monthly	Annual

January 1, 1980 to December 31, 2016 which establishes the baseline climatic conditions of the area. The key parameters of collected meteorological data have been summarized in Table 7

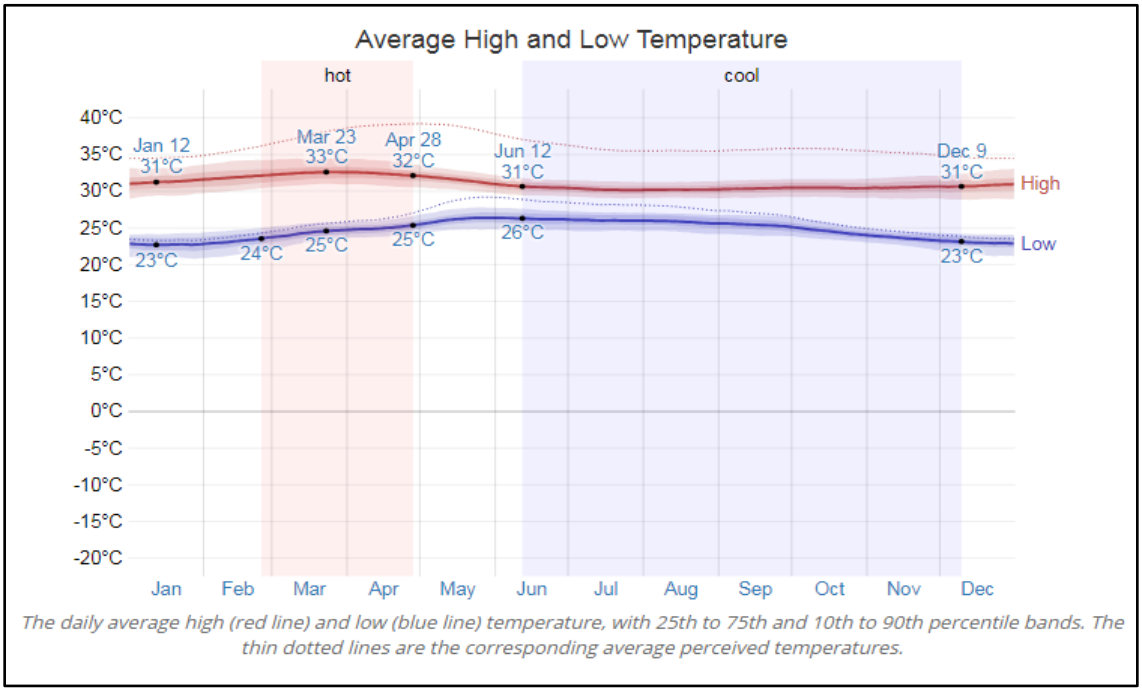
Table 7: Summaries of the Climatological Data

Mean daily max temp (^{0}C)	32 ^{0}C	30 ^{0}C
Mean daily min temp (°C)	24 ^{0}C	25 ^{0}C
Total rainfall (mm)	59mm	234 mm
Wind speed (km/h)	9 km/h	15km/h
Cloud cover (partly cloudy/ mostly cloudy)	Partly cloudy – 11% of the time	Mostly cloudy – 57% of the time

Source: https://weatherspark.com

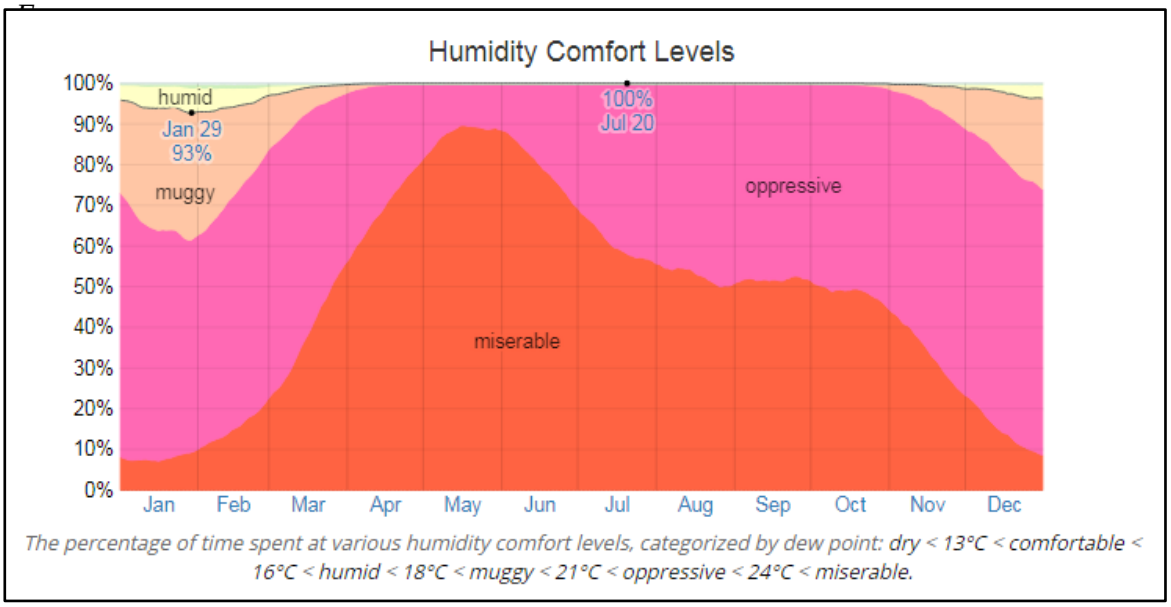
148. **Temperatur**e: The hot season lasts for 2 months, from February 24 to April 28, with an average daily high temperature above 32°C. The hottest day of the year is March 23, with an average high of 33°C and low of 25°C. The cool season lasts for approximately 6 months, from June 12 to December 9, with an average daily high temperature below 31°C. The coldest day of the year is January 15, with an average low of 23°C and high of 31°C. The monthly mean minimum and maximum daily temperature chart shown in centigrade is given in Figure 9.

Figure 9: Variation of Temperature Average in the Project Area



Source https://weatherspark.com/

149. The perceived humidity level in Homagama, as measured by the percentage of time in which the humidity comfort level is *muggy and oppressive* does not vary significantly over the course of the year, staying within *4%* of *96%* throughout (refer figure 10).



Humidity comfort level

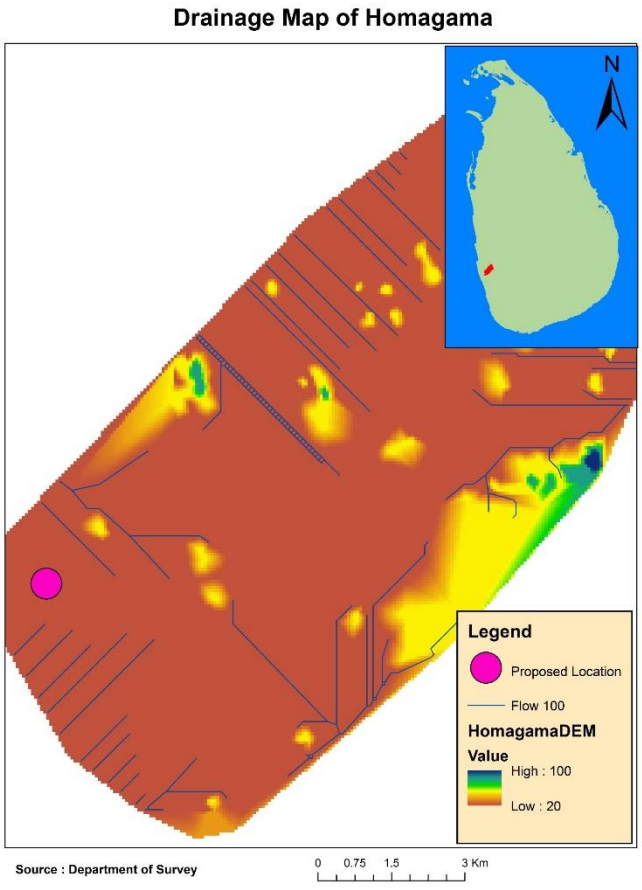
Source https://weatherspark.com/

150. **Wind speed and direction:** The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages The average hourly wind speed in

Homagama experiences significant seasonal variation over the year. The windier part of the year lasts for about 5 months, from May 5 to October 15, with average wind speeds of more than 15 kilometers per hour. The windiest day of the year is June 10, with an average hourly wind speed of 21.3 kilometers per hour according to the annual records. The calmer time of year lasts for 6.7 months, from October 15 to May 5. The predominant average hourly wind direction in Homagama varies throughout the year. The wind is most often from the west for 8.5 months, from February to November. The wind is most often from the north for 3.4 months, from November to February.

151. **Drainage and the River Systems**: Homagama area is a part of the river basins of Kaluganga and Kelani ganga. The Puss Eli Oya located in the northern part of the area is forming as part of the Kelani river basin and the small streams which are flowing to the southern part of the area to Bolgoda lake are being connected with Kalu ganga and forms the Kalu ganga basin. [12] The drainage map for homagama area is given in Figure 11 . It shows that the project area is not prone to flooding.

Figure 11: Drainage map of proposed site



[12] UDA Hom

Source: Prepare by TMS

152. The first pipe borne water supply scheme for the Homagama PS area was constructed by the National Water Supply & Drainage Board in 1995. The Palletwatte supply scheme supplies water to Homagama and Kasbawa areas. Mattegoda housing scheme has a separate water tank to supply the scheme[13],

4.7 Ambient Air and Noise Quality

153. To draw up a baseline status of the ambient air quality the UOSJP will take the measurements prior to the commencement of the development project.

154. To assess the baseline value for the background noise level, ambient noise monitoring will be conducted by the UOSJP prior to the construction activities at the site

4.8 Surface and Ground Water Quality

155. Individual well water is the main source of water in the area with and 88% dependency on it. The under ground water table is at a depth of 2-5 m. The source of water according to household is given in Table 8.

Table 8: The source of water according to household

Source	No. of families	Percentage
Protected well (Within the premises)	30,694	66.03
Protected wells (Outside the premises)	8,124	17.47
Unprotected wells	2,101	4.52
Tube Wells	215	0.46
Pipe born water (Within the premises)	3,079	6.62
Pipe borne water (Outside the premises	1,744	3.75
Other (Lakes and canals)	101	0.21
Not specified	422	0.90
Total	**46,980**	**100**

Source: Dept. of Censes and Statistics & National Water Supply & Drainage Board

[13] UDA

156. The baseline data on water quality will be collected for two locations within the project area by the UOR and will be monitored, analyzed and assessed during the construction and operational period. The water quality results will indicate quality of the adjoining surface water. An assessment of water quality will be done to check coliform count, BOD, COD to obtain the baseline value. Before the construction, it is recommended that the above test be carried out.

157. The project site runs a possible risk of erosion due to water flow in the sloppy terrain and natural drainage from adjoin developed land

4.9 Ecology and Biodiversity

158. Natural flora of the proposed project site mainly consists of few trees, and shrub vegetation (Figure 12). The adjacent area of the proposed site is characterized by home gardens in East, and West. South is covered by paddy fields. The flora found in the site are ordinary, and not rare or protected or of unique importance. There are trees and shrubs disturbed by human activity. The adjoin lands also contains very poorly managed low productive coconut trees.

159. There are several food web interactions in theses paddy fields. Ploughing (Figure 12), flooding, adding fertilizer before planting and at critical growth stages, application of pesticides, weedicides, manual weeding and abandoning the fields after harvest to fallow are an integral pan of rice cultivation (Figure 12). these practices impact the population dynamics of the rice field[14]. Aquatic phase of the paddy field is colonized by amphibian, fish species. These are then attracted by predator species such as king fisher herons, egrets, monitor lizard, water snakes.

Figure 12: Animals in paddy cultivation

[14] Edirisinghe, J.P. and C.N.B. Babaradeniya. (2006)Rice field an ecosystem rich in biodiversity. *j. Natn.Sci.Foundation Sri Lank4 2006 34(2): 57-59*

Egrets feeding on the arthropods during the ploughing

Cows and Egrets feeding on fallowed paddy system the

160. The rice field waters have become the home of several mosquito species, some of which are disease vectors. The aquatic snails too play the role of intermediate host to certain diseases causing organism. There are predator arthropods such as regular orb weavers spider, irregular space -web spinner and cursorial hunting spider. In a rice field there are about 40 species of pest. There are 90 species who predator upon these pest[15]

161. **Conclusion** There is no significant biodiversity issues associated with the project. This is a monoculture coconut plantation prior to the land development and hence there was no biodiversity concern.

Figure 13: Existing Vegetation conditions

[15] Edirisinghe ield
Natn.Sci.Found

Source: Captured by TMS

162. **Fauna** With regard to fauna, some common birds such as bulbul (*Pycnonotus leucogenys)* and Myna (*Acridotheres tristis melanosternus*) and among other nests observed on the trees however, the species are not rare or protected. There plates are provided in figure 13 Furthermore some butterflies, dragon flies also observed. Small vertebrates and invertebrates were found in the shrub land. The proposed land for the construction is a bare land with grasses and open soil due to removal of top soil.

Figure 14: Fauna in Project area

163. **Waste Management:** Due to the absence of a proper management system disposing of solid waste is a problem to the Homagam Pradeshiya Saba[16]. According to the data analysis, it reveals that the main issue in solid waste is the haphazard disposal of it rather than the high generation of the waste. Kahatuduwa, Polgasovita area where the

[16] UDA Homagma Development Plan 2009

project is located is an areas that generates high loads of solid waste[17]. The daily volume of disposal was around 9.0 Mt in 2009. However, the issue of unregulated solid waste disposal is higher in the region with recent development. Currently the HPS operated open waste disposal. The HPS collects 22.2 tons of unsorted solid waste and spends Rs 15,590 on waste management activities[18] HPS collection cost on spends unit (ton) Rs1,404 and disposal cost Rs 305[19]. Collection and disposal of solid waste is a problem in the project site.

4.10 Educational, Medical and Religious Properties

164. Within Homagama DSD has 130 pre-schools, 37 governmental schools, 74 Buddhist dharma schools, and 84 registered tuition classes. Of the schools 7 are "A" Grade Maha Vidyalayas which have education facilities up to Advance Level. There are 20,837 students and 1053 teachers in these schools. The Teacher-pupil ratio is 1:20. Of the total schools in the area, 30 have laboratory facilities and 31 have library facilities. Apart from school education facility, the Technical College at Godagama, the Buddhist Pali University at Pitipana, District Agriculture Training Centre at Pitipana and the 4 vocational training centers are other main education institutions located in the area. There are 16 vocational training courses conducted by the Godagama Vocational Training Centre.

165. Homagama base hospital is the main hospital in Homagama DSD. There are 46 midwifes and 11 health officers within the DS. There is only one Ayurveda Hospital and an ayurveda doctor in the DSD.

166. The Ambulgama Purana Viharaya in Homagama DS division has a high historical value. It comes from the time of that arrival of Lord Buddha to Kelaniya, this Ambulgama Purana Viharaya is also referred to as "Nailata Puuta". This temple also is home to the branch of Sri Maha Bodhi. This temple was established in 1246 by King Vijayaba. It is located 13.23 km from the FOE site. In addition there are Meegoda

[17] ibid
[18] Data Collection Survey on Solid Waste Management in Democratic Socialist Republic of Sri Lanka Japan International Cooperation Agency (JICA) 2016
[19] ibid

Purana Viharaya, Lenagala Rajamaha Viharaya, Sri Sudharmarama Vihara in this DSD.

4.11 Demographic details of affected population

167. There is a total of 81 GN Divisions within the Homagama Divisional Secretariat. The total DS population is 255,316 of which 48.56% is male and 51.43% is female. Homagama is predominantly a Sinhala area having 98.35% Sinhala, 0.58% Tamil, 0.59% Muslims, 0.47% other (including Burgher, Malay, Chetty). When considering the ethnicity within the DSD, 96.98% of the population is Buddhist

168. 0.44% Hindu, 0.71% Islam, 1.06% Roman Catholic. There were 64,827 housing units in total.

169. The agriculture sector provides employment for 4.98%, 5.29% in industrial sector and 21.96% in service sector in total labor force in the Homagama DSD. Population in Homagama engages in agricultural, industrial and fishing with some employed in the government sector. The predominant work force in Homagama engages in the service and industry sectors.

170. Agriculture and Livestock practices: Within Homagama DSD, Paddy cultivation plays a more important role than vegetables and other cultivation. Vegetable varieties such as brinjal, radish, long beans, bitter gourd, and etc. are cultivated. Apart from vegetables, other crops such as cinnamon, pepper, coffee, ginger, areca, maniyok, kiri ala, fruits and flowers are also cultivated. Livestock also plays an important part in economic activities in Homagama DSD

171. **Industry and Economy**: Homagama area is been identified as a future growth centre in the Western Province and there are many industrial estates located at present in Katuwana, Templerburg, Meegoda and Panagoda. There are 60 large industries dispersed in the area. In total, there are 140 industries and 7440 employees working in these industries[20]. The project site is located 4.70 km away from the industrial zone.

172. The highest land value prevails in Homagama Town Centre. The land value of commercial areas range from Rs. 100,000 – 1250,000 per perch in Homagama Town Area. In the sub-centers of Pitipana, Makumbura the commercial land value has also

[20] UDA Homagma Development Plan 2009

increase with the new development. It is anticipated that the project adjoin area land prices will increase with the demand of immigration.

4.12 Analysis of alternatives

173. Although the proposed FOE development project is located in close proximity to a paddy land, impacts associated with construction stage are temporary and short term. Any long term impacts can be managed by adhering to the ESMP. Also, there is no existing facility in the vicinity that can be developed as an alternative to the proposed project. Therefore, examination of alternatives to the project‘s location, design, technology, and components show that it is compliant.

174. By looking at Table 14, it can be concluded that “With” project scenario, with positive/beneficial impacts will greatly enhance social & economic development of the region and improve the environment, when compared to the “Without” project scenario, which will further deteriorate the existing environment and quality of life. Hence the “With” project scenario with some reversible impacts is an acceptable option rather than the “Without” project scenario. The implementation of the project therefore will contribute positively to improve the environmental quality in the area and the associated surroundings. It will result in holistic development of the economy and improve the region and the country.

175. There will not be considerable increase in the pollution levels during construction. Dust and particulate matter during construction will affect the air quality on a short-term basis. It will improve the access road to project site. It will provide mitigation not only for air, noise, vegetative cover, wildlife and soil erosion but will also provide other appropriate mitigation measures such as maintaining reservation on the southern boundary for the paddy agrarian system and landscaping. It has brought awareness to the solid waste disposal in the area degrading the environment. Alternatives are being sought for this reducing the negative impact on the environment. As the geotectonic report stipulates to date the IEE cannot comment on any design feature suitable for the project.

176. The FOE Project of UOSJP forms an important training center for the engineering students and since accessible to major EPZ and Colombo commercial hub and Green tech city deposit which provides ideal research opportunities for UOSJP students in

engineering sciences. The selected site is strategically located in the Western Province and within close proximity to Kottwa Expressway that connects with the major expressways in Sri Lanka: Biyagama and Katunayake export processing zones are 15.05 km and 39.55 km respectively from the site. Such road connectivity makes the location easily accessible to the student community.

177. The site is 8.03 km from the proposed Green Tech City development under Ministry of Megapolis and Western Development. It is also within 7.43 km to the main UOSJP Campus in Nugegoda and therefore student and staff can easily commute.

178. It is easily accessible to the student community to carry out research and their educational activities. Thus, the development of the land into a training facility will be the better option under the existing condition. Keeping this in view, the site conditions and the scope of development of the area, the 'with' and 'without' project scenarios have been compared as shown in Table 14.

179. Though there is resettlement of 2 households due to the current development, this should be considered a positive outcome as they will be provided with a new land with ownership (at the current location they do now have ownership of the land) and compensation to build a house that is better than what they are currently living in. Both parties have agreed to vacate the current location in lieu of the compensation (see Annex 15).

Table 9: Project scenario

With Project		**Without Project**	
Impacts		**Impacts**	
Positive	**Negative**	**Positive**	**Negative**
Provision of facility to train graduates that are geared to job market and economic and best use of the available space	Water retention surrounding area reduced	Nil	Unemployed graduates who cannot secure jobs are trained which become a social problem of unrest.
Use of the land that could not be used for other purpose except as residential purpose is being used to improve the regional economy and	May contribute to increased flooding in the area.	Land widely available for flood water retention. Reduced the threat of flooding for	Nil

education.		surrounding community	
Land preparation and improvement activities will increase the chance off erosion	Impact on land at the site	No impact on the site	No land development and economic development in the region
Improvement in ecology through maintenance of the natural drainage	Nill	Land is left unproductive and band	Increased soil erosion and degradation of the land Increased
Improved drainage in project site and the surrounding area	Nil	Land no developed and rainwater flows on natural drainage	Flooding conditions during rainy season will be increased
Enhanced trade and commerce	Increase of noise during the construction and operational phase	Nil	Microlevel trade in the area will be limited
The dust associated with vehicles movement on access earth roads will also be eliminated	Short term increase in dust due to earth work	Nil	Further deterioration of the project access road
Increased access to job markets	Nil	Nil	Reduced employment/ economic opportunities There is no additional employment
Employment to local workers during the execution of the project	Outsourcing people from other parts of the country will increase traffic congestion and demand for logistics	Nil	
Better access to other social services such as communication centers, and food cafes	More social networking facilities will create social unrest.	Nil	Arrest of possible significant enhancement and economic development of the region
2 Households provides with land with title deeds and compensation.	Loss of access to 2 households living without ownership of land.	Nil	2 households continue to live without ownership and will eventually be moved out.
Strengthening of	Nil	Nil	In absence of the

local economies and local industries			project, it will be difficult for the Sri Lankan government to finance such a technology education development facility for USJP from its own resources

180. Since there is no free land space that can be developed which is constructional viable in close proximity that can be developed this will be the most suitable site that is economically feasible to the university at this point.

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5 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Introduction

181. The proposed work under FOE Development Project will impact on the environment in two distinct phases. During the construction phase which may be regarded as temporary or short-term; the other during the operation stage which will have long term effects. The negative impacts can be reduced or minimized only if proper safeguards are put in place during the design and construction stage itself. These can include reducing pollutant discharge from waste at FOE and enhancing the landscape to support the agrarian system. An effective mitigation strategy will utilize a combination of both options to arrive at practically implementable measures. Efforts will be worked out to minimize any adverse impacts on the various environmental and social components. Where the impacts on various environmental components are unavoidable, mitigation measures will be worked out to minimize the impacts. The mitigation measures recommended during the construction phase should be included in the contract agreement with the contractor and discussed with them to ensure smooth implementation from the beginning.

5.2 Land and Environment

a) Topography and Geology

182. **Construction Phase**: The impacts on existing topographical setting originate primarily from opening up borrow pits to fulfill the requirement of huge quantity of earth material to raise the DPC level of the proposed building to XXX m MSL considering the southern boundary of the land is lower that the northern boundary at the project site. Aggregate and sand will be procured from the authorized suppliers and prevalent rules will be followed for borrowing of soil. Hence the impact on geology of the region is not considered significant. About XXX m^3 of borrow materials (Total compacted quantity of gravel) is to be used if the site is to be filled. The details of proposed borrow areas investigated with their respective locations would have to be given by the PIU and the site engineer concerned.

183. **Impacts**:

i. Alteration of current land use & change in existing profile of the land due to proposed project location.

ii. Changes of topography due to indiscriminate digging of borrow pits.

iii. Un-managed digging of borrow pits resulting in water accumulation & breeding of vectors.

184. **Mitigation Measures:** Contractor needs to prepare / follow several mitigation / management plan / guidelines for various construction activities. These guidelines are listed below and detailed out in "Part-III ESMP". They also have to consider the following:

- ICTAD Guidelines for Siting and Layout of Construction Camp Guidelines for Siting. Storage of construction materials should be located sufficiently away from the road frontage. Sand, rubble, metal bitumen and cement should be covered. All cement, bitumen (barrels), oil and other chemicals should be stored and handled on an impervious surface above ground level (e.g. concrete slab) and should be enclosed ensuring that no storm water flows in to the structures. There should be adequate ventilation to avoid accumulation of fumes and offensive odour that could be harmful
- ICTAD Operation and Re-Development of Borrow Areas Guidelines for Siting, Extraction of construction materials should be undertaken only from mines and quarries approved by Geological Survey and Mines Bureau (GSMB). Gravel for the compaction and filling is supplied from government authorized pits. If new material extraction sites need to be located, those should exclude areas which are public and environmentally sensitive. Burrow areas shall not be opened without permission of the site engineer. Environmental requirements and guidelines issued by the CEA, GSMB and LAs should be followed with respect of locating material extraction sites, other operations and rehabilitation of extraction sites at the end of use. Transport, loading and unloading of construction materials should not cause a nuisance to surroundings by way of noise, vibration and dust. All drivers should have valid license for the category of vehicles they drive and follow the speed limits of roads.

Construction materials should not exceed the carrying capacity of trucks and the local road.

- .ICTAD Operation and Re-development of Quarrying and Stone Crushing Operations
- ICTAD Guidelines for Siting and Management of Debris Disposal Site
- ICTAD Guidelines for Preparing Comprehensive Waste Management Plan

185. **Operational Phase**: In the operation phase, the temporarily modified land use pattern such as temporary construction camps / tents would be dismantled. The FOE project, after completion of its construction, would consist of neat landscape pleasing environment.

186. **Impact**:

i. Likely change of land use due to squatter / encroachment within project land area and the surroundings.
ii. Likely change of land use due to site preparation including earth filling of the site and building in the project area.
iii. Likely change due to construction of the earth drains on the northern and the southern part of the boundary of the project site.

187. **Mitigation Measures:**

i. Immediately after the construction phase, it is necessary to ensure that no further deterioration or major land use changes such as ribbon development takes place in a manner that will jeopardize the interests of the UOSJP.
ii. Squatter development along the project shall be strictly avoided by proper regulation and vigilance.
iii. Land use control measures will be prepared & administered to avoid occurrence of induced development as far as possible.
iv. Establishment of boundaries with walls, fences etc, at the commencement of construction.

5.3 Water and Environment

188. **Drainage and Hydrological Flow**: There is a canal on the southern boundary of the site notified by Department of Agrarian Services of Sri Lanka. Similarly, common

property resources such as canal tank will be affected by the proposed project unless managed accordingly. The FOE project site is 25m from the nearby agrarian canal. The agrarian system is a wetland that is protected the Department of Agrarian Services Development. There has not been an assessment of the seasonal flooding experienced at the site however, the drainage flow map shows that this is not a flood risk area (Drainage Map TMS MAP figure 11). Construction activities will also create temporary floods during the monsoonal season.

189. Based on the visual observation records taken in the vicinity during the monsoonal period it is evident that Department of Agrarian Services Development does not satisfactorily carry out its responsibilities on maintenance of the agrarian canal[21]. There is no drainage channel system surrounding the project site at the moment. These lands are devoid of any form of vegetation.

190. **Impacts**:

i. Since the project site is near the agrarian system and no proper storm water drainage systems are in place, there will be a risk of soil erosion during heavy rains.
ii. Poor or non-availability of drainage facilities on the adjoining land without any green cover is another factor contributing to soil erosion.
iii. Increased incidence soil erosion and stagnate water pools due to obstruction of natural drainage courses by the FOE building construction embankments
iv. Chances of filling of existing drainage courses during earth filling
v. Increase of mosquitoes and other vectors increasing health risk.

191. **Mitigation Measures:** As the existing drain will be suitably augmented and properly reinforced & additional drainage structures will be constructed, it will not obstruct the water flow in the agrarain canal. Construction activities will not aggravate soil erosion condition in the area if mitigation measures are followed by the contractor.

[21] Form the key informants interview with the Grama Niladari Ms Damayanthi

i. Adequate building and roadside drains will be provided along property to facilitate its better maintenance. Details are provided in section 2.1 Figure 6.

ii. Detailed drainage plan and soil erosion investigations need to be carried out and accordingly capacity of existing drainage works & cross drainage (CD) structures have to be duly augmented wherever necessary, to accommodate high discharges from the adjoining lands and to avoid possible formation of water pool at the project site.

iii. Construction works of culverts will be taken up during the lean flow periods to minimize the impacts on drainage.

iv. Maintain design features such as drainage structures.

v. Construction work near natural drainage channels of agrarian canal will be carried out in such a way that flow of water is not blocked and even if it has to be blocked mitigation to be adopted.

vi. Suitable drainage at construction site & camp will be provided to eliminate the chances of formation of stagnant water pools that leads to soil erosion & breeding of mosquitoes.

vii. Propose a storm water drainage system around the FOE complex to capture monsoonal drain waters during heavy rain and reduce runoff.

viii. Reduce the inflow locations adjacent to the site, i.e. the side drains of the road need to be constructed by the relevant authorities (Homagama Pradeshiya Saba, RDA).

ix. Drains, of the project site and agrarian canal should be cleaned regularly to ensure smooth flow of water. This includes the regular maintenance of the downstream main peripheral drain. UOSJP will have to keep close connections with the relevant authorities in ensuring the water drains are cleaned especially prior to the commencement of the rainy season.

x. Temporary earth drains should be provided until required line or earth drains are provided after excavation or during other construction activities.

192. Design and maintenance of the suitable sewerage system during floods for the FOE so that it will not impact the ground water table. Avoid construction of sanitation or other facilities that will use and store harmful materials

5.4 Water Use

193. During the construction period water is required for compaction of embankment, dust suppression, concrete mixing and domestic use in the construction camp. The estimated tentative water requirement during construction stage will be calculated by the site engineers before the commencement of the project. See Table 10

Table 10: Breakup of fresh water requirement during construction

SN	Purpose	Quantity (KL)
1	a) Project road construction b) Construction related to earthwork c) Construction of WMM d) Bridges, culverts, retaining walls & other structures	
2	Dust suppression and wheel washes	
3	Ready mixed concrete wagons Site / general cleaning Specialist / high pressure cleaning	
4	For drinking & other use	
5	Labour camps/Temporary Accommodation Toilets, catering, washing (personnel)	
6	General Site Activities Tool washing Rinsing	
7	Wet Trades • Brick/blockwork • Screening • Concreting • Plastering • Core Boring • Lightweight Roofing • Ceramic Tile • Bentonite Mixing • Rendering	
8	Groundworks	

	• Grouting • Drilling/Piling	
9	Cleaning • Cleaning Tools and Small Equipment • Plant and Equipment • Paintbrush Washing	

194. **Operation Phase**: the water will be a limiting resource unless a proper water supply system is established. Ground water should not be used without testing for construction. Prior approval should be sought from WRB since currently water scarcity is prevalent on sites that are newly developed[22]. Water would have to be supplied from outside for the construction purposes in bowsers.

195. **Mitigation:**

i. Obtain the water supply connection to the site from the NWSB and calculate the requirements of water when the FOE is in operation and during construction activities in order to avoid likely impacts on other users. Above measure would avoid pressure drops experienced in the water supply line

ii. The contractor will arrange water required for construction in such a way that the water supply to nearby communities remains unaffected.

iii. If tube-wells are to be bored, from the polluted water table to supply the water required for construction, a prior approval of the WRB has to be obtained by the Contractor. Without permission from WRB, contractor will not be allowed to extract ground water.

iv. Wastage of water during the construction should be minimized.

196. **Water Quality Monitoring**: Apart from provision of the mitigation measures, water quality shall be monitored to understand the effectiveness and further improvement in designs in reducing the concentration of pollutants. The monitoring plan shall be functional in construction as well as in operation stages. Once the detail pans are available monitoring points and the intervals will be decide by the Environmental Officer.

[22] UDA Homagama Pradeshya Saba Plan

197. **Silt Fencing**: Silt fencing should be provided to prevent sediments from the construction site entering into the nearby water channels. The silt fencing consists of geo textile with extremely small size supported by a wire mesh mounted on a panel made up of angle / wooden frame and post. The frame will should be installed at the edge of the agrarian canal along when construction is in progress. It is proposed to install silt trap at the edge of all water bodies located along the project site location

198. **Ground Water Recharge Pit/ Rainwater Harvesting Structures:** Unlined drain in the project may also be connected with the ground water recharge pit to facilitate the recharge of runoff water in to the ground, augmenting the water table of the project area. Ground water recharge pits shall be constructed to facilitate the infiltration of runoff water into the ground. Paved surface of the FOE project will reduce the percolation of runoff water and decreases the ground water recharge. Location of proposed ground water recharge pits will be reviewed by the Sr. Environmental Specialist of the Independent Engineer and finalized in consultation with PIU. These locations should be permanent which shall be handed over to the university maintenance engineering body at the end of the project so that the water shortages can be reduced to a certain extent

199. **Adopt soil control measures:** Engineers should adopt soil control measures which will be utilized to manage the drain water flow rate on the proposed development. These measures include any soil erosion defenses that the proposed development site may benefit from, design and layout of the development.

200. The study area has a soil erosion problem. Building side drains to receive discharge from embankment surface and surrounding area runoff and carry it safely to the nearest outfall point ensuring safety to the embankment toe, which is the area most vulnerable to erosion / failure.

201. **Functional Sanitary facilities**: The ground water at the site may be unsuitable for consumption and therefore would have to depend on securing the water connection. The water connection needs to be secured through NWSDB for use during construction and operation. It is important that functional sanitary facilities are maintained in the university to avoid health risks and spread of disease

202. Regular sanitary facility checks and maintenance to be carried out by university. Already the design lay out of the building proposes a maintenance space. Maintenance staff should be employed for running of these sanitary facilities

203. Water storage facilities such as provision of a water storage tanks should be in place so that there will not be any shortage experienced during project implementation

5.5 Air Environment

204. **Construction Phase:** Particulate matter would be the predominant pollutant affecting the air quality during the construction phase as it is likely to generate considerable quantities of dust, especially during dry condition. Dust will be generated mainly during excavation, backfilling, hauling & transportation activities to the site, loading/ unloading, spilling of material during transportation, and open storage of fine construction materials.

205. The maximum desirable limits as per the National Ambient Air Quality Standards are given in Part 1 Annex-16 and the monitored values should correspond with the table.

206. Undesirable gaseous pollutants will be generated mostly by the construction machineries. However, suspended dust particles may be coarse and will be settled within a short distance of construction area. Therefore, impact will be temporary and restricted within the closed vicinity of the FOEP and the access road only.

207. **Air quality monitoring** Apart from provision of the mitigation measures, air quality shall be monitored. The monitoring plan shall be functional during the construction period.

5.6 Noise Environment

208. **Construction Phase:** During the construction phase, noise will be generated due to movement of operation of light & heavy construction machineries (i.e., dozer, tipper, loader, excavator, grader, scraper, roller, concrete mixer, generator, pump, vibrator, drilling machines, crane, compressor etc.) that are known to emit sounds with moderate to high decibel value.

209. Noise generated from sources mentioned above will be intermittent and mostly during daytime. Atha Gala temple and the settlements around the project will have some

impact. However, the workers are likely to be exposed to high noise levels that may affect them.

210. **Impact:** Increase in noise level due to construction activities like operation of construction equipment. Between 80-95 dB (A). The magnitude of impact from noise will depend upon types of equipment to be used, construction methods and also on work scheduling. Typical noise level of various activities associated with the project is presented below Table 11.

Table 11: Noise Level of Road Construction Activities

Sl. No.	Construction Activity	Noise Level dB(A)
1.	Grading & Clearing	84
2.	Excavation	89
3.	Foundations	88
4.	Erection	79
5.	Finishing	84

Note: Measured at Leq assuming 70 dB(A) ambient noise level

211. General conclusion can be based on the types of construction work anticipated, the likely equipment required and their associated range of noise levels. Typical noise level of principal construction equipment is presented below.

Table 12: Typical Noise Level of Construction Equipment

Clearing		Structure Construction	
Equipment	**Noise Level dB(A)**	**Equipment**	**Noise Level dB(A)**
Bulldozer	80	Crane	75-77
Front end loader	72-84	Welding generator	71-82
Jack hammer	81-98	Concrete mixer	74-88
Crane with ball	75-87	Concrete pump	81-84
Concrete vibrator	76		

Excavation & Earth Moving	Air compressor	74-87	
Bulldozer	80	Pneumatic tools	81-98
Backhoe	72-93	Bulldozer	80
Front end loader	72-84	Cement & dump trucks	83-94
Dump truck	83-94	Front end loader	72-84
Jack hammer	81-98	Dump truck	83-94
Scraper	80-93	Paver	86-88
Grading & Compaction	**Landscaping and Cleanup**		
Grader	80-93	Bulldozer	80
Roller	73-75	Backhoe	72-93
Paving	Truck	83-94	
Paver	86-88	Front end loader	72-84
Truck	83-94	Dump truck	83-94
Tamper	74-77	Paver	86-88

Source: U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations. Building Equipment and Home Appliance. NJID.300.1. December 31, 1971

212. **Mitigation:**

i. All machinery, equipment and vehicles should be maintained in a good condition by engaging skilled mechanics and regularly maintained in compliance with National Emission Standards (1994).

ii. Noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinance, No 924/12) should strictly be implemented for crushers, construction vehicles and equipment. The maximum permissible noise levels at boundaries of the land in which the sources of noise is located for construction activities are 75dB (A) L eq and 50 dB (A) Leq during day time and night time respectively (Day time: 6.00 am - 7.00pm, night time: from 7.00 pm - 6.00 am). However Contractor should limit working time for activities that create noise from 6.00 am to 6.00 pm.(Note: LAeq'T' means the equivalent continuous, A- weighted sound pressure determined over a time interval T (in dB).

5.7 Impact on the Fauna and Flora

213. **Construction Phase:** The species richness presently in the project area and the surroundings are not significant. However the agrarian system on the southern boundary which is 10 acres (part of a 40 acre system) is composed of paddy which supports ecosystem services such as supporting, regulatory, provisioning and cultural.

214. Activities such as site clearing, construction of culvert, mining of boulders, removal of trees and green cover vegetation and etc., will potentially not impact on the ecological resources of the area by means of disturbing habitat. However, increasing soil erosion and surface runoff, creating noise and vibration at the project site etc are some of the impacts encountered.

i. Several invasive species have been established in the project site and the associated ecosystem. Construction machinery would bring in more invasive species in to the area. Overall impacts will be insignificant on the fauna and flora as it is already a disturb habitat.

ii. Egrets, water herons, king fisher that were observed feeding at the agrarian system will be disturbed with the construction work. Construction activities would increase the level of fumes and the noise at the site.

iii. Effect on aquatic fauna in the water canal can occur in case of accidental oil spill & toxic chemical release find its way into the water bodies during construction and operation of the FOE.

Figure 15: aquatic fauna in the water canal


Egrets and king fishers in the paddy field


Indian pond Heron in the paddy field

215. **Mitigation:** Adoption of certain practices of mitigation will ensure that the project land and its surrounding habitat will be enriched without further degradation.

i. Outright removal should not be done for the invasive species, as they are providing necessary ecosystem functions. Thus selective replacement of such exotic and alien invasive species with native species should be done.
ii. Saplings for tree planting program should comprise of native or endemic species which is suitable to the existing climatic condition of the project areas. Native plant species are suggested for the tree planting program is listed in Table 13 which will enrich the habitat. Also the local agricultural department office should be able to provide recommendations.
iii. Actions should be taken for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents.
iv. All the construction workers and staff of the project unit should be made aware and educated about the presence of the flora and fauna in the area. Environmental awareness program should be provided to the Contractor, labours and all staff deployed at the site.
v. All staff / workers should be instructed not to chase or disturb any fauna seen near the project area.
vi. Noise has to be kept under control by regular maintenance of equipment and vehicles. "No honking" board shall be placed near the boundaries. Noisy activity shall be prohibited during night time.
vii. Construction debris should not be dispose in the wetland areas.

Table 13: list of species suggest for habitat enrichment

Family	Species	Sinhala name	Type
Sapotaceae	*Mimusops elengi*	Muuna mala	Tree
Calophyllaceae	*Calophyllum bracteatum*	Valu keena	Tree
Myrtaceae	*Syzygium caryophyllatum*	Dan	Shrub
Melastomataceae	*Melastoma malabathricum*	Maha boowitiya	Shrub
Phyllanthaceae	*Glochidion zeylanicum*	Hunu kirilla	Shrub
Phyllanthaceae	*Margaritaria cyanosperma*	Karw	Tree

Phyllanthaceae	*Bridelia moonii*	Pth kela,	Tree
Apocynaceae	*Wrightia antidysenterica*	Idda	Shrub
Bignoniaceae	*Stereospermum tetragonum*	Dunu madala	Tree
Calophyllaceae	*Calophyllum inophyllum*	Doba	Tree
Combretaceae	*Terminalia bellirica*	Bulu	Tree
Dilleniaceae	*Dillenia retusa*	Godapara	Tree
Elaeocarpaceae	*Elaeocarpus serratus*	Weralu	Tree
Euphorbiaceae	*Mallotus tetracoccus*	Buu kenda	Tree
Lamiaceae	*Clerodendrum infortunatum*	pinna	Shrub
Lauraceae	*Cinnamomum verum*	Kurudu	Tree
Lauraceae	*Litsea longifolia*	Rath keliya	Tree
Lecythidaceae	*Barringtonia racemosa*	Diya midella	Tree
Fabaceae	*Erythrina fusca*	Yak Erabadu	Tree
Lythraceae	*Lagerstroemia speciosa*	Murutha	Tree

5.8 Cumulative impacts

216. According to the ADB Environment Safeguards Sourcebook cumulative impact is described as: "The combination of multiple impacts from existing projects, the proposed project and anticipated future projects that may result in significant adverse and / or beneficial impacts that cannot be expected in the case of a stand-alone project." The sourcebook also describes induced impacts as: "Adverse and / or beneficial impacts on areas and communities from unintended but predictable developments caused by a project, which may occur at later or at a different location.

217. Economic activities supporting FOE like lodging, and restaurants are expected to increase with new student population and induce development in the project area. The project area has good infrastructure for training of highly skilled graduates in Civil , Computer, Electrical and Electronic, and Mechanical Engineering fields.

218. The construction of the FOE will provide better multidisciplinary engineering trained graduates to meet the future demands of the engineering industry. There graduates will demonstrate ability to function effectively as an individual in multicultural teams, with the capacity to be a leader as well as an effective team member. Construction of FOE will lead to (i) Reduction in travel time to access resourced laboratories that are located in different places in the district (ii)

state-of-the-art ICT and civil engineering research labs to carry out education and research (iii) Apply modern techniques, resources, and IT tools to complex engineering activities (iv)Design systems, components or processes that meet specified needs of the engineering industry (v) Access to new teaching and learning methods competitive edge to secure quality job that ensures personnel security. (vi) Being located close to Colombo and being connected with the satellite cities such as Ratmalana Malabe, (vii) increased opportunities to collaborate with local and overseas companies engaged in engineering activities.

219. In terms of environment safeguard issues, the project is expected to enhance the disturbed surroundings with habitat enriched green building on site. However, during the operation phase, the solid waste and waste water treatment will generate issues if not properly managed. Currently the Local Authority of Homaga experience difficulties in regulated disposal of solid waste. Improvement in local economic conditions can also result in unorganized and illegal establishment of settlements and businesses along the access roads creating new problems of social issues. To address these potential problems, relevant local authorities and the university will have to monitor developments and strictly enforce rules.

5.9 Climate Change Impact and Risk

220. Changes in the atmosphere have been detected that could drastically alter the climate system and the balance of ecosystems. Rising CO_2 concentrations increase the energy retention of Earth's atmosphere, leading to a gradual rise of average temperatures and global warming. This leads to unprecedented changes in the weather patterns including precipitation levels, intensities and frequencies.

221. **High Precipitation Impacting Channel /Embankment**: Heavy rains can cause disruption of the water ways surrounding the project site and embankments, surface water drainage problems, among others. Increased channel flow will result from precipitation and storminess may result in damages to embankment of the channel, drains pavements, and other building structures (such as down pipes etc). If bridge / culvert capacities are reduced or exceeded it carrying capacity can cause minor flood to occur.

222. **Rain induced soil erosion:** The land is composed of 0-30^{0}slope and observation of project associated land show that there is a higher tendency for soil erosion. Adoption of a shallow type of foundation will ensure the stability of the building[23](refer full soil report,(partial data from soil report is in annex 2)

223. **Lighting and wind**: Climatic condition of high wind and precipitation lighting strike could be experienced. There is a risk of fire or property damage as the high tension electrical wires are located in close proximity to proposed industrial center at the FOE.

224. **Mitigation**: Several mitigation measures can be adopted and these include adoption of soil erosion control measures. This would include:

i. Ensure the adoption of key engineering measures taken to address soil erosion in the design of the building. Required inputs should be sought from architects and engineers regarding prevention of soil erosion on the southern boundary of the land. The architectural design should be geared to accommodate extreme rainy condition related disaster.

ii. A drainage management plan should be developed for the site to ensure that the outfall to the canal embankments do not become eroded, which would destroy the marginal vegetation and increase the flooding risk.

iii. Adopt measures suggested by CEA, Department of Agrarian Services and Development on construction near the agrarian system. Obtain their approval and clearances prior to construction.

iv. Design and construction must be adequate to resist the anticipated forces of rain.

v. Make sure that the drains are cleaned regularly - obtain the assistance of the Homagama Pradeshiya Saba for this purpose. Faculty has to carry out regular maintenance of channel, culverts and drains adjoining the site to make sure that there are no local flooding conditions. With the construction of houses in the adjoining plotted land, there is a possibility of drains and culvert being blocked. University will be required to monitor

[23] Geotechnical report USJP

the situation and adopt necessary measures. Allocate fund by the PIU for this purpose.

vi. Ensure that the building and the equipment is properly insured for claims of natural disaster and lightning resistors installed. The building design be designed and material used should withstand lightning and wind speed.

5.10 Design of FOE buildings under the green building

225. FOE building design and layout will follow the guidelines of the Green Building SL certification systems so that it is designed for higher performance, lower environmental impact. Under this system a building would be evaluated under eight categories and these include Management (MN), Sustainable Sites (SS), Water Efficiency (WE) , Energy & Atmosphere (EA) , Material & Resources (MR) , Indoor Environment Quality (EQ) , Innovation & Design Process (ID) and Social & Cultural Awareness (SC) This includes incorporating engineering design which would consider the following:

a. Usage of recyclable materials like wood substitutes
b. Installation of sustainable energy efficiency certified equipment
c. Usage of energy efficient lighting fixtures (LED)
d. Provision of photovoltaic cells on roofs for solar power
e. Rain water harvesting structures planned for ground water recharge and rain water collection

226. **Impact:** Flaws in the FOE design may lead several negative impacts that may influence the students' wellbeing and function of the university complex. Lack of thermal circulation and lighting condition within the school complex will increase the electricity requirement and cause occupational safety issues for the students and staff. In the absence of a properly designed waste water and solid waste disposal system in the university complex, it may lead to health and environmental degradation of the immediate surroundings. In the absence of a disability access such as elevators or stair ways in the building design will prevent disable students from enrolling for the training program. Therefore these aspects will be required to be thought of at the design stage of the project Lack of provision of adequate sanitary facilities for the maximum capacity of students and

staff can lead to sanitation issues. This may lead to outbreaks of illnesses among the student population.

227. **Mitigation:**

i. Overall building design should incorporate design features that improve the energy efficiency and water saving devices. In whole the green building designs principles should be applied wherever possible.

ii. Ensure maximization of natural lighting and thermal circulation in the building. Employ passive design strategies, including building shape and orientation, passive solar design, and the use of natural lighting, to dramatically impact building energy performance.

iii. Including safety and health measures with due regard to future maintenance and repairs. The labs and cafeteria kitchen should be equipped with fire alarms and fire extinguishers. Fire and emergency evacuation routes should be incorporated sufficiently. Gas storage areas should be built in to the designed and should be placed in a place that is ventilated.

iv. Demarcate an area within the building design for storage of cleaning equipment and garbage storage until disposal. Though a general room has been identified in the lay out plans there is no garbage collection area that is being demarcated.

v. To avoid overcrowding of the sanitary facilities it is important that in the design the toilets should be constructed based on the ratio 1:25 within the hostels. Design a waste water sewage tank that has a low operation cost and requires minimal maintenance. It should be properly designed to separate the sewage and the bathing water so that it does not exceed the limits of the occupancy level of the building. The choice of technology will depend on volume of wastewater and sewage generated; economy of scale; regulatory requirements, etc. (Design details are in figure 5). The project management unit of UOE has initiated the process reevaluating the building designs.

5.11 Risk of Fire and Emergency Preparedness

228. **Operational Phase**: Once the FOE building is in operation, there could be incidents of student unrest or technical errors in the laboratories that may trigger off fire**.**

229. **Impact:** This may cause damage to property and risk lives

230. **Mitigation**: Several mitigation measures can be adopted and these include adoption of disaster risk reduction strategy and preparedness. This would include: Identification of an emergency evacuation point in the building and placing emergency alarm system in the building to warn the student population of any such situations. Emergency evacuation points should be identified and plan of evacuation developed. Check with the Department of fire regulation on the specification of building accessibility for a fire extinguishing truck. Identification of flaws in the emergency operation plan and develop a revised plan for implementation

5.12 Occupational Health and Safety and General Public

231. **Construction Phase**: Both within and outside of project affected areas could create accidental harm to general public and work force. Construction of culvert on the access road, excavation on site, removal of trees, working on building at heights processing and transportation of construction materials are the main causes associated with accidental risk.

232. **Impact:** Majority of skilled and unskilled workers should be selected from the project influence area to avoid generation of waste and sanitation problems from labour camps. About XXXX workers under the categories of supper skill, semi-skilled and unskilled will be engaged by the contractor. This may result in conflict situations among the workers and settlers near worker camps. Spreading of communal diseases is also possible due to migrant laborers.

233. **Mitigation measures:** ADB guidelines for contracted should be included in the contract issued to the contractor with any necessary modifications.

i. Contractor should organize awareness programs about personal safety for workers. This should provide briefing and training on safety precautions, their responsibilities towards safety, etc.

ii. Contractor shall comply with requirements for the safety of the workmen as per the International Labour Organization (ILO) convention No. 62, Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that is applicable to his contract. Other than that, the contractor has to comply with regulations regarding safe scaffoldings, ladders, working platforms, gangways, stairwells, excavations, trenches, safe means or entry.

iii. Contractor shall comply with requirements for the safety of the workmen as per the International Labour Organization (ILO) convention No. 62, Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that is applicable to his contract. Other than that, the contractor has to comply with regulations regarding safe scaffoldings, ladders, working platforms, gangways, stairwells, excavations, trenches, safe means or entry.

iv. Use of licensed and trained vehicle operators, provision of protective footwear, helmets, goggles, eye-shields and clothes to workers depending on their duty (mixing asphalt, blasting, handling equipment) should be adopted.

v. The construction labour camp should be equipped with first aid facilities and a trained personnel onsite in case of an injury

vi. Ample lighting around the construction site should be provided during the night.

vii. Excavated areas for construction should be barricaded using barricading tapes, sign board should be placed. Quarry operations, land excavations and blasting should be carried out and supervised by trained personnel.

viii. Regular safety checks for vehicles and equipment‘s, allocation of responsibility to relevant personnel, prohibition of alcoholic drinks and other substances which may impair judgment of workers engaged in construction activities, arrangement of proper first aid and transport facilities for injured people, installation of warning signs should be adopted.

ix. Onsite emergency plan for minor accidents and mishaps will be prepared by the contactor with the consultation of the PIU.

5.13 Waste Disposal and Sanitation

234. **Construction Phase: Impact**

Solid waste associated with construction and other related works (construction debris, spoil, and waste generated from labour camps, officer‘s accommodations) may impose several negative environmental and social impacts to the project affected area including impact on ecology, public health and scenic beauty. A proper permanent disposal site for these spoil material should be identified early on so that is will not impact the environment.

235. **Mitigation**

i. Presently at the FOE colour coded bins are placed for disposal of waste. However the waste is not processed within the university premises.
ii. Contactor and the engineers should consult the Homagama Pardeshya Sabha (HPS) at the onset of the project on waste collection and disposal. Solid waste management is significant problem with the demographic growth and development experienced in the HPS area. Coordinate with the Kahathuduwa PHI and develop a suitable mechanism for disposal. Come to an agreement with the HPS on solid waste disposal
iii. Labour camps, garbage disposal sites and material storage yards provide favorable habitats for vectors of diseases like mosquitoes and rats. Decaying wastes attract pests such as rats and flies which become unhealthy, dirty, and unsightly. Contamination of water bodies with wastewater, construction debris and spoil will create significant impact on aquatic lives and people inhabiting the area.
iv. Seek approval from the DS and HPS for storage and disposal of spoil material and other gravel.
v. Selected disposal site by the contractor should exclude areas which are close to public and environmentally sensitive areas. Prior approval for the disposal site should be obtained from HPS via Grama Niladhari.

vi. All debris and residual spoil materials (soil, sand, rock, and deadwoods) generated from construction activities shall be re-used wherever possible for site leveling, back - filling under instruction of State Engineering Cooperation (SEC), Engineers from PIU. Dump materials should be placed without interference to the irrigation canals, water bodies, agricultural lands or any other environmentally sensitive sites.

vii. Proper solid waste disposal, sanitation and sewerage facilities (drinking water, urinals, toilets and wash rooms) should be provided to the site of construction/labour camps. Location of labour camps should be approved by the SEC Engineer and comply with guidelines/recommendations issued by CEA and HPS.

viii. Practice cleanliness and good housekeeping practices on site. Provision of proper drainage facilities to minimize stagnation of water around worker based camps and keeping the drainage facilities clean at all times to prevent breeding of rats and other vectors such as flies. Garbage bins should be provided to all workers based camps, construction sites and should be dumped regularly in a hygienic manner under the inspection of **Kahathuduwa Public Health Inspector** (PHI) in the area. PHI. expressed concern on construction related waste disposal. Refer notes on the stakeholder meeting Annex 7

ix. Clearing of construction camp and restoration. Contractor to prepare site restoration plans for approval by the engineer (PIU). The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, at the contractor's expense, to the entire satisfaction of PIU.

236. **Operational Phase**: Waste disposal and sanitation becomes an important consideration with the occupancy level of the FOE buildings.

237. **Impact:** Domestic solid waste will be generated as a result of cooking activities within the **canteens** and consumption of packed food brought in by the students. As solid waste would not be disposed daily and since Homagama is already

having a waste management problem, piling up of waste will obscure the environment and lead to heath risks.

238. **Mitigation:**

i. Until a sustainable and self sufficient solid waste management plan is developed within the FOE enter into an agreement with the HPS for waste collection and disposal on a daily basis. Develop a schedule for collection with the consensus of the HPS. Provide the information to the janitorial staff within the FOE. Allocate budgetary provisions within the FOE budget for their services.

ii. Develop a composting mechanism for FOE. Especially for the kitchen waste generated from the canteens. Establish a composting program and include a space provision in the design for this activity. Obtain financial support and guidance from CEA for the composting project.

iii. Train the students on importance of social responsibility and garbage disposal. Provide colour coded bins at several locations to encourage source separation.

iv. Establish a waste management plan for the institute. Ensure demarcated solid waste storage area with source separation for organic waste and other domestic non-organic waste. This storage facility should be able to accommodate solid waste up to 7 days until disposal.

v. Prevent solid waste disposal to canal, culverts and drains within the project site.

vi. Come to an agreement on with the services provider on disposal of mechanical waste generated as result of maintenance work on equipment and computers and machinery etc. procured for FOE.

vii. Illegal garbage dumping & firing including asbestos dust will be a health issue to neighboring houses and it will be a health issue to students in the new faculty building. It is suggested that asbestos is not used in the

building as it will be banned in 2024[24]. Use alternative roofing agents for the building during design.

5.14 Domestic liquid waste disposal

239. **Impact**: Unregulated disposal of domestic waste water will impact the ground water table and the surrounding agrarian systems on the southern border of the project land.

Mitigation

i. Properly designed waste water treatment plant is in place
ii. Ensure that the domestic waste water is directed to waste water treatment plant in conformity with the CEA, Local Authority guidelines and should not be discharged to the environment prior to the treatment.
iii. In instance of overflow, leaks, immediate repairs should be carried. Establish and collaborate with the Local Authority under such circumstances.

5.15 Health and Safety of Trainees

240. There are no anticipated significant impacts during the operation and maintenance of the project. However, the students of the faculty may not be aware of occupational safety related issues and the impact associated with it. This may lead to injury and accidents during practical and training. When practical sessions are conducted in the labs, it may lead to emergencies and accidents.

241. **Mitigation:**

i. First aid should be available on site in each of the labs.
ii. Fire extinguishers and alarm system to be provided. Fire escapes should also be provided for each building.
iii. Emergency switches should be properly covered and placed in each laboratory.

[24] Daily Mirror 20th December 2017. Ban on asbestos relaxed

iv. A pedestrian crossing traffic light at the Kottawa – Polgasowita Road should be provided so that it would be easier for the student and staff to cross over the road and this will ensure their safety.

5.16 Adopt food safety guidelines

242. **Impact:** Unless food and safety guideline are carefully adopted in the **canteens**, there will be increased risk of health and hygiene of the food that is prepared within the kitchens. If students don't maintain personal hygiene, it could affect their studies as well as the university. Canteen staff should maintain personnel hygiene as they will be the initial point of contact of food.

243. **Mitigation:** Adopt food safety regulation imposed by the Ministry of Health. (Refer the Annex 14 for food regulations details).

i. Train the canteen operators and improve awareness on food and safety and the national guidelines. These include adoption of food safety handling measure.

ii. Ensure that the waiters and food service personnel practice regular hand washing during working hours especially when entering food handling area.

iii. Ensure that food service personnel maintain personal hygiene and inform the canteen operator in case there are sick or has an injury.

6 PUBLIC CONSULTATION

6.1 Approach to Public Consultation

244. Public Consultation Meeting (PCM) provides an opportunity for the general public, private and community bodies to know the environmental and social impacts as a result of project implementation. Thus, the meeting was held for residents around the project areas, public sector and private sector agencies who are concerned with the project during the initial stage. Major purpose of the public consultation is to identify the environmental issues in the IEE study and to appraise the stakeholders on potential environmental impacts. This will provide an opportunity to collect their feedback so that adequate safeguards can be considered during the planning phases.

245. **Arrangement**: Venue for the meeting was fixed at the meeting room of Faculty of Graduate Studies at the UOSJP. Affected communities and potential stakeholders such as a Buddhist monk from the adjoining temple, Dayaka saba head from Athagala temple, HPS officials, official from Homagama DSD, Project Director of Ministry of Megapolis and Western Development, Grama Niladari from Maththegoda West (location of the land), adjoining land Grama Niladari of Krigampamunuwa, General Manager and the Chief Assistant of the Prime Lands (Pvt) Ltd, Deputy Director and Director Engineering in Consultancy Department of Planning Department in UDA, Deputy Director of RDA S.P.H.I. from Kahathuduwa M.O.H., PHI, FOE students and academic staff, General Manager of the Prime Lands (Pvt) Ltd, Chief Assistant of the Prime Lands (Pvt) Ltd villagers from Krigampamunuwa etc. were invited to attend the meeting. Effort was made to make the gathering representative of the local population directly or indirectly affected by the potential impacts. There were 21 stakeholders at the meeting. (Annex 07 provides the participant list).

6.2 Methodology

246. Discussions, Questions and Answers: In the meeting, the participants were informed of the proposed project and potential environmental impacts due to the project. Thereafter, time was allowed for questions and answers to facilitate interaction with

the stakeholders, exchange of information, collect their opinion on the environmental issues and any other issues that needed addressing. See Figure 18.

247. Collection of Feedback: A feedback questionnaire in local language (sinhala) was presented at the common forum and then asked each of the stakeholders to express their views regarding the question. These questions were presented by the consultants conducting the meeting and answers sourced. (Annex 7 provides the list of questions presented). Participants were encouraged to provide their opinion through the feedback questionnaire, however it was kept voluntary. Some of the participants could not fill the forms as they could not read or write. The issues broadly covered in questionnaire included the following topics listed in 6.3.

248. **Record of the Meeting**: General information of the participants such as Name, gender, and name of the organization the participant belongs to along with their signature was recorded during the public consultation meetings and is attached in the report as Annex 07. Registration was kept voluntary. Almost all of the participants registered themselves.

6.3 Analysis of the collected feedback

249. A total of 21 stakeholders participated in public consultation meeting. Information was gather on following topics

i. Perception of building stability and the lay out plan
ii. Perception on noise vibration and dust
iii. Perception on grown water quality in the area adjacent to the site
iv. Perception on the water drainage and soil erosion
v. Perception on ecology and biodiversity issue
vi. Perception of the connectivity to the project site through the road network
vii. Perception of community befits as result for the FOE complex
viii. Perception of the education offered at the faculty
ix. Perception of the solid waste management by the HPS
x. Perception of the waste waster management at the new FOE premises
xi. Perception of the community settlement and access road usage for adjoin settlement at the project site
xii. Approval of green building certificate

xiii. Approval from the Ministry of Megapolis and Western Development

250. **Outcome of the Public Consultative Meeting:** The following are the major points of concern of the participants of PCM. Detailed account of meeting is provided in Annex 07.

i. Design and implement a drainage plan for the project and improve soil conservation measures.
ii. Manage the agrarian system in a way that would not pollute the ecology of this habitat.
iii. Reservation limits to be maintained minimize the impact of the project on the agrarian canal.
iv. Managing noise, dust and vibration at the site.
v. Importance of obtaining clearance from the Department of Agrarian Service and Development, Homagma Pradeshiya Saba (HPS), CEA and UDA for the project.
vi. Establish a funding mechanism as well as a schedule for maintenance and cleaning work of the drains and the agrarian canal associated with the project.
vii. Contact HPS on the future plan concerning the solid waste management of the university. Enter into a temporary agreement on removal of solid waste until the composting program is established within the university.
viii. Establishment of a waste water treatment plant to reduce water pollution and discharge in the agrarian canal.
ix. Proper road signage and speed control measures with a traffic light for pedestrian road crossing at the Kottawa – Polgasowita road is one of the most sought after road safety measures by the stakeholders.
x. Importance of students maintaining communal harmony with the local villagers

Figure 16: Plates of Stakeholder meeting

Plate 1 Prof. Amaratunga Vice chancellor UOJ & Dr. Subasingha Dean Faculty of engineering UOJ addressing the meeting

Plate 1 Prof. Amaratunga Vice chancellor UOJ & Dr. Subasingha Dean Faculty of engineering UOJ addressing the meeting

Plate 3 Mr Ajith resident adjoin in the university property house No 12/A Kithulahena

Plate 4 Mr. Ruminda, General Manager of the Prime Lands (Pvt.) Ltd)

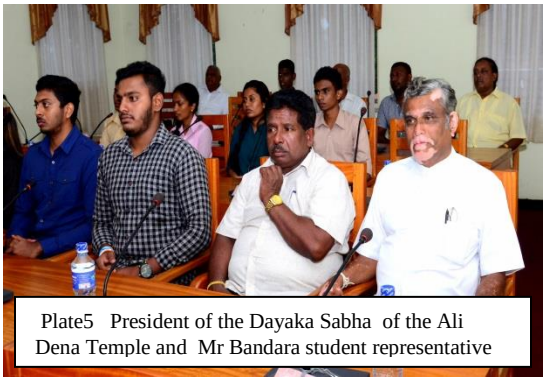

Plate5 President of the Dayaka Sabha of the Ali Dena Temple and Mr Bandara student representative

Plate5 President of the Dayaka Sabha of the Ali Dena Temple and Mr Bandara student representative

Plate7 Mr. B.M.A. Bandara, S.P.H.I. from Kahathuduwa M.O.H

7 ENVIRONMENTAL SOCIAL MANAGEMENT PLAN

7.1 Environmental Social Management Plan

251. An environmental social management plan (ESMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels (refer Part III).

252. The EMP will guide the environmentally-sound construction of the project and ensure efficient lines of communication between MOHE, project management unit (PMU), project implementing unit (PIU), consultants and contractors. The ESMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The ESMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

253. The contractor will be required to submit to PIU, for review and approval, a site environmental plan (SEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved ESMP; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No work will commence prior to approval of SEP.

254. A copy of the ESMP/approved SEP will be kept at the site during the construction period at all times. The ESMP will be included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

255. For civil works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved SEP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and SEP. The contractor shall allocate budget for compliance with these SEP measures, requirements and actions.

7.2 Implementing Arrangement

256. MOHE of Government of Sri Lanka will be the Executing Agency for the Program, responsible for management, coordination and execution of all activities funded under the loan. A PMU attached to MOHE will be responsible for implementing the Technology and Human Resource Development Project. The PMU will be supported by the PIUs with flexibility to re-deploy depending upon the implementation requirements. The PMU and PIUs will be supported by several teams of Design Consultants in preparation of preliminary engineering designs.

257. Project Management Consultant (PMC) centrally located in PMU and with field teams located in PIUs shall be responsible for implementation of the Program. All infrastructure contract will be procured through performance-based contracts (PBCs) and include build operate (BO) framework. Based on the preliminary designs prepared by Design Consultants, the DBO (design-build-operate). The preparation, review, and approval of project design and due diligence studies including bidding process is centralized at the PMU. PIUs will provide necessary support to PMU in preparation, and will play main role in supervising the construction process.

258. **Safeguards Compliance Responsibilities:** PO will ensure that environmental assessment is conducted, and the compliance, and corrective actions, if any are reported as required At the PIU, a Project Manager will be given additional responsibilities of safeguard tasks and will be designated as Assistant Environmental Officer (ASO). ASO will oversee the safeguards implementation at PIU level and report to PO (Environment) at PMU. Specifically ASO will coordinate public consultation, information disclosure, regulatory clearances and approvals, ESMP implementation and grievance redress.

259. **Monitoring and reporting** Monitoring of quality of water, air and noise during construction stage is a responsibility of the contractor by the approved Government Monitoring Agency. All construction activities such as site supervision, removal of trees, material extraction, verification of permits etc. by contractor will be supervised by consultant engineer of building department. The environmental monitoring report will be submitted to safeguards officer of PMU at the MOHEH.

260. The budgetary provision for the implementation of the ESMP of the project can be categorized in to two types and is presented below

- **i.** Environmental and Social Management Plan to be implemented by the contractor under civil works contracts
- **ii.** Environmental Social Management Plan Works to be implemented by the FOE

261. A capital cost provision of about Rs XXX has been kept towards implementation of environmental management plan. Summary of environmental budget is presented in Table 14.

7.3 Environmental Monitoring and Reporting

262. The FOE at UOSJP will monitor and measure the progress of ESMP implementation while supervising civil construction activities. PIU will undertake site inspections and document review to verify compliance with the ESMP and progress toward the final outcome. PIU will submit quarterly ESMP monitoring and implementation reports to PMU of the MOHEH, who will take follow-up actions, if necessary. The MOHEH will review and consolidate the quarterly reports to prepare bi-annual monitoring reports to ADB.

263. ADB will review project performance against the **executing agency's** commitments as agreed in the loan documents. The extent of ADB's monitoring and supervision activities will be commensurate with the **project's** risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is submitted.

Table 14: Monitoring Plan for FCT for Preconstruction, Construction, and Operation Phases

SI No	Field environment attribute	Phase	Parameters to be monitored	Location	Frequency a	Responsibility	Cost
	Air quality	During preconstruction phase	Nitrogen oxide, sulfur dioxide, carbon monoxide, particulate matter (both 10 micrometers and 2.5 micrometers or less in diameter)	FT construction at UOR	Once in the preconstruction phase to establish baseline	Contractor through approved monitoring agency	
		During construction phase			Once in every 3 months (except monsoon season) during construction phase (24 months construction phase)		
		During operation phase			Once bi-annually except during monsoon season during first 2 years		
2	Water *quality*	During preconstruction phase	Eason Total dissolved solids, total suspended solids , pH, hardness, biochemical oxygen demand, fecal coliform	FT or UOR groundwater	Once to establish the groundwater quality before construction	Contractor through approved monitoring agency	
		During construction phase			Once in every three month during construction phase		
		During operation phase			Once every year except during monsoon during two years		

	Noise levels	During preconstruction phase	Noise quality as per National Ambient Noise Standards on dB(A) scale	FT or UOR construction siter	Once in the preconstruction phase to establish baseline	Contractor through approved monitoring agency	
		During construction phase			Once in every 3 months (except monsoon season) during construction phase		
		During operation phase			Once every season except monsoon season for first 2 year		

7.4 Grievance Redress Mechanism

264. The affected person(s)/aggrieved party can give their grievance verbally or in written form to the local site office of FOE project site Mattegoda, Homagama. Grievances of affected person will first be brought to the attention of the site in charge, who can resolve the issue at the site level. If the matter is not solved within 7 days period by the site in charge, it will be brought to the Grievance Redress Committee (GRC) constituted for the purpose in PIU. This GRC shall discuss the issue in its monthly meeting and resolve the issues within one month of time after receiving the grievance. If the matter is not resolved by GRC at PIU level within stipulated time, it shall be referred to GRC at PMU level by Project Manager of PIU.

265. **Registering complaints:** GRC at PMU shall discuss the issue and try to resolve it and inform the PIU accordingly. If the matter is not resolved by the GRC at PMU level within one month of time the matter will be referred to State Level Empowered Committee (SLEC), who will resolve the compliant within one month through mediation. The PIU and -project site office shall keep records of all grievances received including contact details of complainant, date of receiving the complaint, nature of grievance, agreed corrective actions and the date these were affected and final outcome. For this a complaint register will be maintained at each sub-project site. The complaint will be registered by the aggrieved party by duly filling the form provided (refer Annex 17). The PIU will establish a public response centre (PRC) helpline specifically addresses the issues arising out of project implementation. Compliant can be registered via any of the following means:

Through Public Response Center Help Line

Land Line Number

Mobile No:

WhatsApp:

E-mail

266. The cost for functioning of GRM will be accounted for in project cost as part of PIU functional cost. Additionally, person(s) / aggrieved party who are, or may be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The accountability mechanism provides an independent forum and

process whereby people can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected person(s) / aggrieved party should first make a good faith effort to solve their problems by working with the ADB resident mission.

267. The PIU Level Grievance Redress Committee (GRC- PIU) – This committee will comprise of Project Manager, Site In charge and one officer from contractor team. The GRC- PIU will be headed by Project Manager (PIU). It will meet at least once a month. The agenda of the meeting will be circulated to all the members and the affected persons/aggrieved party along with venue, date and time at least a week prior to the meeting.

268. The PIU Officer (SO) will have the overall responsibility for timely grievance redressal on environmental issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

269. This GRC at PMU will be headed by the managing director, and senior representative of PIU and other implementing agencies as relevant. The aggrieved party / person(s) can approach court of law any time with or without filing complaints at PIU or PMU level. The following mechanism is adopted from the World Bank mechanism currently identified for MOHEH. The mechanism may need further review once the implementation sets in.

Table 15: Monitoring Plan for FOE for Preconstruction, Construction, and Operation Phases

SI No	Field environment attribute	Phase	Parameters to be monitored	Location	Frequency a	Responsibility	Cost
	Air quality	During preconstruction phase	Nitrogen oxide, sulfur dioxide, carbon monoxide, particulate matter (both 10 micrometers and 2.5 micrometers or less in diameter)	FOE construction at USJP	Once in the preconstruction phase to establish baseline	Contractor through approved monitoring agency	
		During construction phase			Once in every 3 months (except monsoon season) during construction phase (24 months construction phase)		
		During operation phase			Once bi-annually except during monsoon season during first 2 years		
2	Water quality	During preconstruction phase	Eason Total dissolved solids, total suspended solids , pH, hardness, biochemical oxygen demand, fecal coliform	FOE or USJP groundwater	Once to establish the groundwater quality before construction	Contractor through approved monitoring agency	
		During construction phase			Once in every three month during construction phase		
		During operation phase			Once every year except during monsoon during two years		

	Noise levels	During preconstruction phase	Noise quality as per National Ambient Noise Standards on dB(A) scale	FOE or USJP construction site	Once in the preconstruction phase to establish baseline	Contractor through approved monitoring agency	
		During construction phase			Once in every 3 months (except monsoon season) during construction phase		
		During operation phase			Once every season except monsoon season for first 2 year		

8 INSTITUTIONAL IMPLEMENTING ARRANGEMENT

To be discussed and finalized between ADB and MOHE.

9 CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion:

270. The IEE study did not find an adverse incompatibility with the surrounding physical, biological, socio-economic or cultural environment and does not pose any significant long term environmental threat if all identified mitigation measures are carefully attended to. The most likely impacts during the construction phase are expected to be temporary in nature and could be mitigated with proper management and good practices. The GRM and ESMP provide appropriate guidance for suitable environmental and social safeguards. Accordingly, the proposed project can be recommended for implementation with strict adherence to ESMP and GRM provided in this IEE.

271. Most of the adverse impacts of FOE during construction period are short term and temporary in nature. Environment friendly construction methodology has been incorporated into the project design and the ESMP has been prepared to minimize the overall impacts on the environment during the proposed project civil works. Since the proposed project is likely to experience soil erosion, it is recommended that careful observations be made during the current rainy season on further design improvements and incorporated proper drainage.

272. As per the Government of Sri Lanka regulation, Environmental Clearance is not required for the proposed project under the National Environmental Act. However, EPL Clearance from CEA, Department of Agrarian Services and Development clearance, Homagama Pradeshiya Saba clearance, UDA green building certificate will be required before start of construction. Already UDA zoning approval has been obtain for the establishment of FOE despite the fact that the area has been demarcated as a residential area under the zonation of Megapolis plan.

273. Geotechnical report recommends that soft foundation be adopted in the detail designing of the project. However the geotechnical report does not analyse with respect to the proposed master plan which details out the respective space allocations of the buildings and the expected load bearing of each building. Therefore, the load bearing capacity should be compared with recommended values given by ICTAD once the design plans are developed. The geo technological report does not provide any alternative for a soft foundation nor provide any conclusive recommendations to draw up any conclusion.

9.2 Recommendation:

274. The ESMP has been prepared incorporating various modern technologies and guidelines to reduce the environmental impacts of project constructions to make it a Green building. Therefore, it is recommended to follow the ESMP and associated Guidelines during construction and operation phases of the project.

9.3 Measures to be adopted to improve the habitat around the project site

275. **Solid waste Management on site**: At FOE, currently there is no solid waste management plan. FOE should take measures at the inception of the construction of the building to consult with CEA and develop a proposal for solid waste management like other universities. As an engineering institution that is trying out modern technology they should develop a mechanism that is suitable for solid waste disposal that has no carbon foot printing and zero emissions.

276. Solid waste disposal generated during the construction and operational phase will obscure the environment and lead to pollution problems. The best way of disposal of waste is to develop a waste management plan for the project as included in the ESMP. Degradable solid waste can be composted while spoil material and other debris should be disposed at approved identified dump site.

277. Until this is established it is recommended that UOSJP seek an agreement with the HPS to receive solid waste and dispose of it.

278. **Waste water management: Waste water disposal**: Waste water should be treated in a treatment facility that can handle the occupancy capacity of the designed buildings and there should be adequate funding allocated for the operation of the facility though out FOE operation. A Bio Up-flow Anaerobic Floating Filter Technology could be adopted for the building and this would be a low cost waste water management technology.

279. Until a waste water treatment plant is established a mechanism should be in place for removal of Sewage using gully bowers to avoid soil contamination. For this liaise with the secretary HPS.

280. **Monsoonal rains**: It is recommended that water drainage plan is developed for the site with proper drains. Preventive measures should be adopted by FOE to minimize soil being transported to the southern boundary where the canal is located. Current land development activities associated with the project has induced sedimentation transport to the agrarian canal (as reported be the Grama

Niladhari). This erosion control plan should include measures to improve the soil condition.

i. Improving the surface drainage system within the project area
ii. Maintenance of the sewerage system during rainy season
iii. Plant grass and shrubs in 20 -30^0 terrain. Use mulch matting to hold vegetation on slope
iv. Add mulch or rocks to soil
v. Build retaining walls
vi. Avoid soil compaction

281. HPS and the Department of Agrarian Services Development pay little attention on the project associated drainage system and the agrarian canal. Since these drainage systems play an important role in the hydrology of the project associated area, UOSJP should follow up with them and develop a schedule to clean and ensure maintenance. Funds within the FOE should be allocated for such management activities.

282. Project associated network of waterways need to be regularly cleaned and maintained For this purpose UOSJP will be required to also consult the RDA and the Homgama Pradeshiya Saba to clean and maintain the roadside drains.

283. Detailed review of drainage plan should be carried out and engineering designs should consider to minimize the risk of soil erosion by adopting strategies within its design. These could be flooding ponds that will capture the excess water during the monsoonal rainy period.

284. The project site should be filled at least up to 0.5 m MSL by keeping minimum freeboard during site preparation. DPC level of the proposed buildings should be generally 0.50 m above the recommended fill level. Hence a detailed review of this should be carried out and engineering designs should adopt erosion management strategies.

285. **Clearances:** UOSJP FOE taken measures to initiate the Green building certification process with the UDA (Annex 1). UOSJP will be required to fill in the BIQ and obtain and EPL for the canteens if they are catering for over 50.

286. **Stability of the foundation**: All building in the proposed FOE should be on shallow type of a foundation that will sand the forces of soil erosion. Since the geo technical information currently available, does not clearly provide information on the recommended structural intervention, it is recommended that the ultimate

skin friction coefficient (fμ) be revisited once the design plans are in place and ensure that they are in line with the ICTAD guidelines (ICTAD/DEV/15)[25].

287. **Provision of water supply**: The ground water quality of the project site needs to be investigated. This was not captured in the geo technical report and no previous studies on the ground water is available to comment on the groundwater quality of the site at the time of this IEE preparation. It should be ensured that the construction workers are provided with drinking water from the onset of the construction phase. It is also recommended that prior to construction, water quality of the dug well or tube well at the site is tested for its suitability for consumption.

288. **Water supply from NWSDB**: Water shortage is experienced in the dry months of the year since the demand for water supply is an ever increasing problem with the rapid urbanization in the HPS limits. Therefore a special water supply line should be established prior to construction in order to prevent any water pressure drop in the supply line. It may impact other stakeholders who consume water around the project location.

289. **Disaster management plan:** During all stages of the project cycle, monsoonal flood, tornado associated disaster action plan should be developed to minimize the economic cost of the project and risks on life and property. More detail account is given in the ESMP.

290. **Habitat enrichment**: A rapid biodiversity assessment on site was not carried out. Several measures should be adopted to improve the habitat around the project site. Planting of recommended species along the reservation of the northern and the southern boundaries of the land with adequate provision to clean the canal and drains is important. Consider the detailed architectural designs and develop a green belt with trees and shrubs on the southern and northern borders of the land to minimize the impact of road and the canal.

291. **Insulation of lighting receptors**: With possible rain and storm it is recommended that the building is secured with lighting receptors to protect the valuable equipment is the state of the art modern labs at FOE.

[25] Geotechnical investigation for proposed building for faculty of computing and technology, university of Kelaniya . April 2018

292. **Access road and others:** Consult the fire department and provide adequate space on road which served within the FOE premises for accessibility of a fire extinguishing truck.

293. **Resettlement**: During the stakeholder meeting two families from the FOE project eastern boundary requested that they be given access form the university premises to their houses. Considering situation Prime Land Pvt Ltd developer of the project land provided them with a settlement package which includes 6 perch land with title deeds 3km from the site. They were also given Rs 500,000 to build a house. The two families agreed to accept the settlement packed. (Refer Annex 18 for details) However the PIU needs to monitor the situation as one household had not vacated the premises at the point at which this report was being prepared. As soon as these 2 households vacate premises, UOSJP should establish their boundary walls/fences.

294. **Environmental monitoring:** Carry out the baseline monitoring of the environmental parameters in order to avoid or manage any environmental pollution associated with the project. The FOE PIU will be required to facilitate environmental monitoring and conduct stakeholder meetings during the operational phase of FOE. For the above purpose there should be proper funding mechanism in place at the FOE.