MINUTE OF MEETINGS
BETWEEN
THE JAPANESE MID-TERM REVIEW TEAM
AND
THE AUTHORITIES CONCERNED OF THE MALAYSIA
ON JAPANESE TECHNICAL COOPERATION
UNDER THE SCHEME OF SATREPS
FOR
THE PROJECT FOR RESEARCH AND DEVELOPMENT FOR REDUCING GEO-HAZARD DAMAGE IN MALAYSIA CAUSED BY LANDSLIDE AND FLOOD

The Japanese Mid Term Review Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") headed by Mr. Yukihiko Ejiri jointly with Japan Science and Technology Agency, visited Malaysia from February 17, 2014 to March 7, 2014 for the purpose of conducting the mid-term review on the Japanese technical cooperation (SATREPS: Science and Technology Research Partnership for Sustainable Development) for The Project for Research and Development for Reducing Geo-Hazard Damage in Malaysia Caused by Landslide and Flood (hereinafter referred to as "the Project").

During its stay, the Team exchanged views and had a series of discussion with the Malaysian authorities concerned. And the third Joint Coordinating Committee (hereinafter referred to as "JCC") was held on March 6, 2014.

As the result of the discussion, the Team submitted the Mid-term review report as attached hereto and both sides agreed upon on the description of the report.

Kuala Lumpur, March 6, 2014

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Mid-term Review Report

for

The Project for Research and Development for Reducing Geo-Hazard Damage in Malaysia Caused by Landslide and Flood

March 2014

Mid-term Evaluation Team

Table of Contents

List of Abbreviations and acronyms

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CEReS	Center for Environmental, Remote Sensing, Chiba University
CKC	Slope Engineering Department, Public Works Department
CP-SAR	Circularly Polarized Synthetic Aperture Radar
DEM	Digital Elevation Model
DID	Department of Irrigation and Drainage
EWS	Early Warning System
GETFLOWS	General Purpose Terrestrial FIuid-Flow Simulator
GIS	Geographic Information System
ICHARM	Global Center of Excellence for Water Hazard and Risk Management
IFAS	Integrated Flood Analysis System
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JKR	Jabatan Kerja Raya (Public Works Department)
JST	Japan Science and Technology Agency
MMD	Malaysian Metrological Department
MMU	Multimedia University
MOE	Ministry of Education
MOU	Memorandum of Understanding
NIED	National Research Institute for Earth Science and Disaster Prevention
NSC	National Security Council
SAR	Synthetic Aperture Radar
UAV	Unmanned Aerial Vehicle
UNITEN	Universiti Tenaga Nasional
USM	Universiti Sains Malaysia

1. OUTLINE OF THE MID TERM REVIEW

1-1 PROJECT OVERVIEW

Floods and landslides are two major natural disasters that cause human losses and economic damage in Malaysia. For the last ten years (2005 – 2014), floods affected 342,526 people and caused the estimated economic damage estimated of 990 Million US dollars in Malaysia (EM-DAT). The economic damage also increase in accordance with the climate change as well as recent population increase and urbanization by rapid economic growth.

In response to the above situation, the Government agencies prioritize the importance of reducing geo-hazard damage caused by landslides and floods. CKC has developed its master plan for slope management (2009 – 2023) and the development of early warning system and awareness building among residents are emphasized. DID has adopted integrated flood management where early warning system is integral part of response plan and its operation.

The project is intended to propose an advanced disaster risk management system with an integrated data system of landslide and flood to DID, CKC and other relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation.

1-2 THE FRAMEWORK OF THE PROJECT

The Project is summarized according to the Master Plan as shown below:

Project Purpose	A trial system of an advanced disaster risk management system with an integrated data system of landslide and flood is proposed to the relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation.
Output 1	Construction of analysis system for temporal change and real-time condition of surface environment by using RS/GIS technologies.
Output 2	Construction of comprehensive advanced numerical flood-runoff models of wide geographical coverage and ones with high resolutions in the Kelantan river basin.
Output 3	Construction of landslide hazard assessment system with considering the impacts of precipitation condition and infrastructure development in Malaysian locality.
Output 4	Construction of comprehensive disaster information database including satellite observation data, flood/ landslide hazard data and disaster mitigation information.
Output 5	Trial proposal of risk management system of flood/landslide disaster aiming at effective utilization of risk information in local government and community.

The full version of the Master Plan is shown in Annex 1.

1-3 OBJECTIVES OF THE MID TERM REVIEW

The main objectives of the Mid Term Review are as follows:

1) To verify the accomplishments of the Project compared to those planned;
2) To identify obstacles and/or facilitating factors that have affected the implementation process;
3) To analyze the Project in terms of the five evaluation criteria (i.e. Relevance, Efficiency, Effectiveness, Impact and Sustainability); and
4) To make recommendations on the Project regarding the measures to be taken for the 2nd half of the project, including modification of the Master Plan.

1-4 MEMBERS OF THE MID-TERM REVIEW TEAM

1) Mr. Yukihiko EJIRI, Senior Assistant Director, Water Resources and Disaster Management Department, JICA (Team Leader)
2) Mr. Koichi KITAMURA, Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA (Evaluation Planning)
3) Mr. Kaneyasu IDA, Senior Consultant, Tekizaitekisho LLC (Evaluation Analysis)
4) Dr. Yoshimori Honkura, Program Officer of Natural Disaster Prevention, Research Partnership for Sustainable Development Division, Japan Science and Technology Agency
5) Mr. Masayuki Sato, Principal Researcher, Research Partnership for Sustainable Development Division, Japan Science and Technology Agency

1-5 SCHEDULE OF THE MID TERM REVIEW

The Review was conducted from 17 February to 7 March 2014. The detailed schedule of the mid-term review is shown in Annex 2.

1-6 METHODOLOGY OF EVALUTAION

The Mid-term Review Team (hereinafter referred to as "the Team") reviewed related documents and information collected through questionnaires and interviews with Malaysian counterpart personnel, Japanese experts and relevant stakeholders. The Team analyzed the Project from the viewpoints of 1) achievements of the project, 2) implementation process, and 3) the five evaluation criteria.

(1) Achievements of the Project

Achievements of the Project were measured in terms of Inputs, Outputs, and Project Purpose in comparison with the Objectively Verifiable Indicators of the Master Plan.

(2) Implementation Process

Implementation process of the evaluated Project was reviewed to see if the activities have been implemented according to the schedule and to see if the Project has been managed properly as well as to identify contributing and/or hampering factors that have affected the implementation process.

(3) Evaluation based on the Five Evaluation Criteria

The project is analyzed and based on the 5 Evaluation Criteria as described below:

Five Evaluation Criteria

1. Relevance	A criterion for considering the validity and necessity of a project regarding whether the expected effects of a project (or project purpose and overall goals) meet with the needs of target beneficiaries; whether a project intervention is appropriate as a solution for problems concerned; whether the contents of a project is consistent with policies; whether project strategies and approaches are relevant, and whether a project is justified to be implemented with public funds of ODA.
2. Effectiveness	A criterion for considering whether the implementation of project has benefited (or will benefit) the intended beneficiaries or the target society.
3. Efficiency	A criterion for considering how resources and inputs are provided as scheduled in a timely manner and converted into outputs.
4. Impact	A criterion for considering the effects of the project with an eye on a longer term effects including direct or indirect, positive or negative, intended or unintended impacts.

5. Sustainability	A criterion for considering whether produced effects continue after the termination of the assistance.

2. ACHIEVEMENTS AND IMPLEMENTATION PROCESS

2-1 INPUTS

2-1-1 JAPANESE SIDE

1) Japanese Experts:

As of February 2014, a cumulative total of 34 Japanese researchers are listed as the experts. During June 2011 and February 2014, 34 researchers were dispatched to Malaysia. The total length of their stay in Malaysia was 176 days. The list of the Japanese experts is shown in Annex 3.

Dispatch of Japanese experts to Malaysia (June 2011 – February 2014)

	Group 1	Group 2	Group 3	Group 4	Group 5	Total
The number of experts (cumulative total)	5 (6)	5 (7)	10 (12)	4 (5)	10 (12)	34 (42)
Group leaders	Dr. Josaphat, (CEReS)	Dr. Tosaka (UT), Iwami (ICHARM)	Dr. Sakai (NIED)	Dr. Hara (VTI)	Dr. Sakai (NIED)	
The number of experts dispatched (days)						
2011	3 (15)	4 (20)	7 (36)	0 (0)	1 (5)	15 (76)
2012	3 (15)	3 (17)	7 (43)	0 (0)	2 (11)	15 (86)
2013			4 (14)			4 (14)
Total	6 (30)	7 (37)	18 (93)	0 (0)	3 (16)	34 (176)

(Source: JICA project office)

2) Training in Japan:

In cumulative total, 105 counterparts (31 from USM, 46 from UNITEN, 22 from MMU, 2 from DID and 2 from JKR) received short-term training in Japan (mostly one to two weeks). Two to three month training was provided to two researchers from UNITEN on IFAS, one researcher from MMU, two from USM and two from UNITEN on CP-SAR and RS. In addition, one Ph.D. student in University of Tokyo from UNITEN supports project activities in Japan.

Training in Japan (June 2011 – February 2013)

	Main topics	Number of researchers	Japanese universities and institutes accepted training
USM	Landslide, EWS	7	NIED, Univ. of Tokyo, Kyoto Univ.,
	GIS, remote sensing data processing	11	CEReS, VTI
	GETFLOWS	6	Univ. of Tokyo
	Workshop & meeting	7	Univ. of Tokyo, NIED
UNITEN	Flood analysis	3	Univ. of Tokyo, ICHARM
	Landslide, EWS	8	Ibaraki Univ., Kyushu Univ., Kyoto Univ.

	CP-SAR	5	CEReS
	GIS, Remote sensing data processing	13	CEReS, VIT
	Visitation, workshop and meeting	17	Univ. of Tokyo, ICHARM, NIED
MMU	CP-SAR, Remote sensing data processing	16	CEReS
	GETFLOWS	2	Univ. of Tokyo
	Workshop and meeting	4	Univ. of Tokyo, NIED
DID	Visitation and meeting	3	CEReS, Univ. of Tokyo, NIED
JKR	Workshop and meeting	3	CEReS, Univ. of Tokyo, NIED
Total		105	

3) Equipment:

The equipment equivalent to 52 Million Japanese yen was provided for the Project. The main items include PC, server, data storage, sensors and gauges installed at monitoring sites, ALOS/PALSAR data and RS, GIS software. Monitoring system for landslide was installed at two sites in Kelantan river basin and one site at East-West highway in 2012. Installation of monitoring system for another site at East-West highway was delayed for almost one year due to slow procurement process. The list of the main equipment provided for the Project is shown in Annex 4.

4) Operation budget:

A total of 600,269 Ringgit was spent during June 2011 and September 2013 for the operation of the Project. The large portion of the operation budget was allocated for travel expenses and airfare for counterpart training in Japan. A total 6,616,738 Yen was spent during June 2011 and September 2012 for the operation of the Project

Operation cost related to Malaysian activities (June 2011 – September 2013)

Items	Amount (Ringgit)
Domestic travel expenses (Project Coordinator)	53,554
International airfare (Project Coordinator)	4,081
Travel expenses (Counterparts)	277,297
International airfare (Counterparts)	240,766
Consumables	7,658
Communication & transportation	1,061
Printing and copying	3,708
Seminar	9,691
Miscellaneous	2449
Total	600,269

(Source: JICA Project Office)

Operation cost related to Japanese activities (June 2011 – September 2012)

Items	Amount (Yen)
travel expenses (experts)	4,150,702
Long term training of counterparts in Japan	964,530
Miscellaneous	1,501,506

Total	6,616,738

*The cost after October 2012 is not identified because the contract with JICA and Univ. of Tokyo continues

2-1-2 MALAYSIAN SIDE

1) Counterpart Personnel

Assignment of Counterpart personnel (June 2011 – February 2014)

	Group 1	Group 2	Group 3	Group 4	Group 5	Total
USM	7		11	4	6	28
UNITEN	12	5	11	14	12	54
MMU	13		6	4	3	26
DID		14				14
JKR			3			3
Total	32	19	31	22	21	125
Group leaders	Dr. Rohayu (UNITEN)	Dr. Lariyah (UNITEN)	Dr. Habibah (USM)	Dr. Chan (USM)	Dr. Ho (MMU)	

The list of the counterpart personnel is shown in Annex 3.

2) Operation cost

At the project planning stage, one factor for project implementation was the uncertainty of fund availability from the Malaysian side. In the first year, the Malaysian side tried to cope with this situation by allocating funds available to the researchers from other sources. In the second year, The Ministry of Higher Education agreed to provide USM with the matching fund (5.27 Million Ringgit) for four years until the end of the project duration. USM distributed fund to other universities based on the proposal submitted and approved by MOE as shown in the table below.

Budget allocation from MOE for four years

Items	USM	UNITEN	MMU	Total (Ringgit)
Salary and Wages	752,000	800,000	752,000	2,304,000
Travelling expenses and subsistence	400,000	320,000	320,000	1,040,000
Research Materials & Supplies	200,000	120,000	120,000	440,000
Professional services & other services	80,000	130,000	160,000	370,000
Rental	72,000	96,000	60,000	228,000
Maintenance and Minor Repair Services	80,000	80,000	80,000	240,000
Equipment and Software	240,000	180,000	230,000	650,000
Total	1,824,000	1,726,000	1,722,000	5,272,000

(Source: USM, UNITEN and MMU)

3) Office

Office space for experts was provided in USM.

2-2 IMPLEMENTATION PROCESS

(1) Project Management

Implementation structure and system

The Project Director oversees the general management of the Project while each group in the three universities conducts their respective project activities. On the Malaysian side, the project management consists of the two levels; (1) the university representative and the group leader level to set strategies, facilitate inter-university coordination and integrate research results among groups and (2) the university level to facilitate project activities within each university. For the first level, they communicated mainly by email, TV conference and participating in JCC. For the second level, each university organized the general meeting once or twice a year, participated in by counterparts from the five groups. The minutes of meeting was produced after each meeting. The group meeting was organized more frequently when they needed to discuss project activities.

On the Japanese side, the project coordinator stations in USM to coordinate with the three universities on such matters as training in Japan and the procurement and installation of equipment, etc. The Japanese researchers communicated with their counterparts mainly when their counterparts had training in Japan. The visits made by the Japanese experts to Malaysia were limited (34 researchers spent 166 days in Malaysia so far.). This was very much so for the third year (only 4 researchers visited Malaysia.). Japanese experts usually stayed in Malaysia for a few days, which was not enough to actually expedite project activities (e.g., field visit, progress review, detailed planning and scheduling to produce outputs and discussion on how to deal with issues and challenges). Also, meeting was not organized in Japan to discuss project activities among Japanese researchers.

The roles and responsibilities of the key researchers are clear, and they are also clear about the scope of the Project as well as the Master Plan of the Project, according to the questionnaire survey.

Technology transfer

Training in Japan was used mainly for technology transfer. It was also used for discussion on project activities in some cases. After training in Japan, all the participants produced their reports, which were compiled and submitted to the Ministry of Education. Sharing of technology and information after training was done with their colleagues involved in the same groups and/or the same university.

Decision-making

The Joint Coordinating Committee has been organized three times since the commencement of the Project. The main agendas and issues discussed and decisions made are shown in the below table.

	Date organized	Main agendas and decisions made
1st JCC meeting	July 2011	✓ Briefing of the project's framework and the scope of work ✓ Discussions on how to acquire data from government agencies and how to get funding from MOE
2nd JCC meeting	November 2012	✓ Addition of Dungan river basin as study area for IFAS due to concern about unavailability of hydrological data for Kelantan (Group 2) ✓ Confirmation of targeting the whole peninsula with respect to

		hazard analysis and mapping for landslide as planned (G3) ✓ Requesting all groups to submit proposal on how to input data in the database (G4)

Communication

Communication was good between Japanese experts and counterparts when they had developed rapport as a result of interactions during the project. Some groups such as G1 and G4 need more interactions between them to develop a close working relationship. So far, not so much inter-group discussion was organized to integrate outcomes of G1, G2 and G3 into G4 and G5. Promotion of project activities and sharing of information among the participants of the projects were mostly done at the individual levels.

The factors that promoted project progress

The Ministry of Education allocated the matching fund (5.27 Million Ringgit) to the three universities to support project activities. The fund helped the researchers recruit research officers and research assistants, and cover travel expenses for fieldwork, etc.

The factors that hindered project progress

The installation of one of the two landslide monitoring stations was delayed nearly one year due to delayed procurement process. This affected data collection and analysis under Group 3.

The Project has faced the problem of getting necessary data from the relevant government agencies. This issue was highlighted in the second JCC and efforts were made by individual researchers to get data. Strong initiative from Malaysian side and bilateral, institutional arrangements are necessary to solve this issue. The following important data were not yet made available for processing by G1 to produce outcomes for G2 and G3:

- ✓ Limited availability of data on river cross section for Kelantan and Dungan from DID (To renegotiate with DID to receive data for selected areas)
- ✓ Unavailability of radar Image data of the whole Malaysia from Agensi Remote Sensing Malaysia due to its high cost

2-3 ACHIEVEMENTS OF THE PROJECT

PROJECT PURPOSE

A trial system of an advanced disaster risk management system with an integrated data system of landslide and flood is proposed to the relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation.

Indicators

1. The landslide/flood models are reviewed by the government agencies for incorporating in their research or actual hazard risk management.
2. The EWS is reviewed by the government agencies for full or partial adoption to improve their existing warning system.
3. The disaster reduction online database is reviewed by the government agencies for update and improvement of their existing database.

Activistes	Main achievements	PIC	Progress	The remaining activities
Output 1 Construction of analysis system for temporal change and real-time condition of surface environment by using RS/GIS technologies. **Indicators** 1-1. Sets of high-quality DEM covering target research sites are prepared. 1-2. The method using multi-temporal spatial datasets is developed.				
1.1 Collection of the natural environmental data such as geological data and meteorological data, the social environmental data such as social infrastructure, population distribution, economic growth, and the data of the disaster occurred in the past	The group members who had participated in training in Japan collected and compiled the existing data from relevant agencies. Also, records of past disasters were being translated into English. The historical data sets of MODIS, JERS-1/SAR and ALOS/PALSAR images were prepared.	Hara Rohayu Che Omar Tay Lea Tien	85%	To continue data collection on the records of past disasters. To discuss the sharing of data.
1.2 Construction of high-quality DEM using RS technologies for landslide/flood analysis	The Group members constructed DEM using ALOS and PALSAR images with resolution of 10m data for East-West Highway and Kota Baru area and Kelantan area.	J.T.Sri Sumantyo Rohayu Tay Lea Tien	50%	To construct DEM for Gerik, Kualalumpur and Penang, using SAR images. To utilize satellite image if data is available from ALOS-2.
1.3 Development of a method to estimate flood/landslide hazardous area from multi-temporal spatial datasets	By integrating flood and runoff area in Kelantan state, a hazard map will be completed for 2000 – 2009 (no data including for 2001, 2002 and 2006).	Hara Rohayu Che Omar Tay Lea Tien	80%	To develop a method to estimate hazardous area based on the historical data of disasters

1.4 Risk calculation of each mesh using the evaluation value of the factor extracted from each element data and ranking of the factor with weight values	The weighted value from Malaysia have been published based on weighted use in land use planning, Geoscience and Mineral department and PWD.	Hara Rohayu Che Omar Tay Lea Tien	80%	To identify the most appropriate method in consideration of types and characteristics of collected data. To conduct risk calculation, utilizing the selected method.
1.5 Feasibility studies on CP/SAR and optical sensor mounted on UAV to be used in the near future	Module for CP-SAR, RF system, data processing unit were jointly produced by both sides. To test CP-SAR, high-resolution land subsidence was observed, using SAR satellite image (JERS-1 and ALOS), DInSAR and PS-InSAR. Workshops on CP/SAR were organized for Malaysian researchers.	J.T.Sri Sumantyo Lim Tien Sze	80%	To further test the feasibility of CP/SAR and optical sensor mounted on UAV/small plane
1.6 Evaluation of the extracted flood damage and the landslide region by the result of the disaster history and the simulation models	The data of landslide history and flood history from 1990 to 2013 have been registered in GIS for Kelantan and Terengganu. The risk and susceptibility map for flood and lanslide have publish.	Hara Rohayu Che Omar Tay Lea Tien	50%	To discuss based on the results from 1.3 and 1.5.
Output 2 Construction of comprehensive advanced numerical flood-runoff models of wide geographical coverage and ones with high resolutions in the Kelantan river basin. **Indicators** 2-1. The flood analysis model for the Kelantan River basin is built based on IFAS. 2-2. The flood-inundation 3-D models with mid- and high-resolutions for the Kelantan River basin are built based on GETFLOWS.				
2.1 Field data acquisition and processing/arrangement for database in the Kelantan River basin and the Dungun River basin	The group members conducted survey on the Kelantan River basin and the Dungun River basin, collected historical hydrological data (rainfall, water level) from Rainfall stations of DID from 90 stations throughout Kelantan and 16 water level stations and 21 stations for 21 telemetry stations. They also grasped the characteristics of radar rain fall data and estimated B and β.	Fukami, Tosaka, Lariyah Mohd Sidek	80% Almost completed for Kelantan and on-going for Dungun	To make adjustment on radar rain fall data for B and β and identify rain gauge data. To input data using flow analytical model and study its applicability to Kelantan River basin and the Dungun River basin. To continue to collect data from newly installed rain gauge and water level to improve data.

2.2 Construction of a wide geographical coverage flood model based on IFAS in the Kelantan River basin and the Dungun River basin	The group members constructed a geographical coverage flood model based on IFAS, entered rain gauge data and yield good analytical results for the Dungun River Basin.	Iwami, Lariyah Mohd Sidek, Muhammad Hafiz Ishak	90%	To clarify issues and points to improve accuracy for Kelantan River basin. To conduct trial run of EWS using auto-calculation system. To try to integrate IFAS into the INFOBANJIR
2.3 Construction of a Mid-resolution 3D hydro-geological model (M3DM) and extraction of risky locations for flood and landslide by judging from the condition of water, topography and geology in selected area	Using DEM data (SRTM, ASTER), collected topographical information and the condition of water, the group members constructed a hydrogeological model. Using the analysis resutls of rain gauge records, the group members constructed daily rainfall distribution data and now conduct matching of flows between the data and simulated results by Guilmard.	Tosaka, Sasaki, Faizah Che Ros Lariyah Sidek	50 %	To complete matching by setting appropriate parameters of river flow model by trial and error, modifying lattices of the model and review the conversion method from rainfall gauge to water level. To train G2 members to learn GETFLOWS and construct the model for the Dungun River basin (February – March 2014)
2.4 Construction of a high-resolution 3D hydro-geological model (H3DM) based on the M3DM extracting flood/inundation prone areas in Kota Bharu, Kelantan	Data except for high-resolution data have been made available. But high-resolution data are not yet available.	Tosaka, Sasaki, Faizah Che Ros Lariyah Sidek and other UNITEN researchers	20%	To request the data. To utilize satellite data and CP/SAR if the data are not available.
2.5 Comparison of IFAS and GETFLOWS model with atmospheric based model currently developed in Kelantan River basin	Not yet conducted.	Iwami and Nabesaka, Tosaka, Sasaki, Lariyah	0%	To plan how to conduct comparison for the same disasters and how to use the models for different purposes To integrate the results and EWS into INFORBANJIR by discussing with DID and other stakeholders of INFOBANJIR
Output 3 Construction of landslide hazard assessment system with considering the impacts of precipitation condition and infrastructure development in Malaysian locality.				

Indicators 3-1. Site-adapted 2D/3D physical models are developed. 3-2. Warning information is provided based on observations by landslide monitoring stations.				
3.1 Hazard estimation of Malaysia Peninsular (large area) with statistical analysis through past landslide and satellite information	The group conducted site survey on disaster areas and statistical analysis, using the past records of landslide near JKR properties and towers. The group also developed a land use and geological map and made comparison with the past landslide data for the whole Malaysia Peninsular.	Murakami, Tay Lea Tien, Fathoni	70%	To further collect data on past landslide and land use and produce a hazard map for Malaysia Peninsular
3.2 Development of landslide prediction method based on 2D/3D physical models with hydrological analysis	In order to conduct theoretical hazard estimation, the group collected rainfall data, goundwater levels, slope structure and soil parameters at monitoring sites. Based on these data, the group conducted hazard estimation using cumulative rainfall volume as the long-term indicator and hourly rainfall as the short-term indicator.	Koyama, Koay Swee Peng, Habibah, Rohayu Che Omar Intan Nor Zuliana Fathoni	70%	To improve accuracy the prediction metbod by reviewing parameters and warning criteria
3.3 Installation of landslide monitoring stations and study on setting of criteria of warning information	The group installed four monitoring stations (two sites on slopes along East-West highway monitored by USM and other two sites in Kelantan river basin monitored by UNITEN.	Sakai, Koay Swee Peng, Habibah, Rohayu Che Omar Nor Hazwani	80%	To conduct data analysis and detailed study on the slopes To set a standard for waring.
3.4 Hazard estimation of the monitoring areas with proposed numerical analysis method	Based on the results of 3.2, the group set a waring line using numerical analysis method.	Koyama, Anton, Norashida Md. Din Nor Hazwani	30%	To collect more detailed data such as parameters and conduct hazard estimation
Output 4 Construction of comprehensive disaster information database including satellite observation data, flood/ landslide hazard data and disaster mitigation information.				

Indicators 4-1. Landslide/flood hazard information system is built. 4-2. Disaster reduction online database is built.				
4.1 Integration of all collected data with time and spatial indicators in a kind of relational database, mainly through GIS processing.	The infrastructure (server, storage and PC) was installed in the three universities. High resolution optical sensor data, JERS-1/SAR, ALOS/PALSAR image data sets were prepared. Thematic maps are being developed in GIS format.	Hara, Obanawa Chan Huah Yong, Norashida	60%	To construct data sharing system, considering the system requirements and the characteristics of various data to be integrated into the system
4.2 Construction of landslide information system (hazard maps, sustainability maps and inventory maps in each scale are collected)	Sensor server was installed with working sensor data.	Hara,Obanawa Chan Huah Yong, Koay Swee Peng, Norashida	10%	To discuss with G3 members and develop database to integrate their outputs
4.3 Establishment of flood hazard information system using numerical and statistical analyses by IFAS and GETFLOWS (M3DM & H3DM) with historical, in-situ and/or any other equivalent hydrological & meteorological datasets	Data requirement of flood data was studied.	Hara, Obanawa, Norashida, Salman Yussof	10%	To discuss with G2 members and develop database to integrate their outputs
4.4 Construction of the database for disaster risk management, mitigation, disaster education and emergency response	Program and data interfaces between G1, G2, G3 and G5 were studied.	Hara, Obanawa, Chan Huah Yong, Ho Chin Kuan	20%	To discuss with G5 members and develop database to integrate their outputs
Output 5 Trial proposal of risk management system of flood/landslide disaster aiming at effective utilization of risk information in local government and community. **Indicators** 5-1. Web-based EWS for landslide/flood hazard is operated in trial basis for selected monitoring area. 5-2. Web-based risk communication tools to improve the interface between local government and community are provided.				
5.1 Assessment of current water-related geo-hazard management system at the	Assessment follows the policy of the National Disaster Relief and Preparedness Committee,	Fukuoka, Rasyikin	40%	To collect additional information to producet a report on the system of

related government agencies in Malaysia	NDRPC. Disaster risk management is divided into three levels of the national, state and local levels. The project will target the local level to provide disaster related information. As a case study, the group compiled the JKR' s policy on disaster management for road.	Chua Kok Hua		government agencies in Malaysia.
5.2 Planning of early warning method (hazard map using real time data) of flood/landslide by numerical analysis with regional characteristics and demands	The group installed server and produced a prototype of risk management system on a trial basis. (http://malaysia-map.ecom-plat.jp/map/?cid=8)	Hazarika Hemanta, Koay Swee Peng, Ho Chin Kuan, Chua Kok Hua	20%	To expand the contents including results from Groups 2 and 3.
5.3 Experimental installation and operation of comprehensive early warning system (EWS) for local potential flood and landslide hazard of monitoring area	The group devised the system to show the results of monitoring sites by group 3 in accordance with the international standard (Sensor Observation Service).	Sakai, Koay Swee Peng, Ho Chin Kuan, Chua Kok Hua	30%	To expand the contents including results from Groups 2 and 3.
5.4 Providing disaster risk communication tools to improve the interface between local government and community through disaster education, decision-making and emergency response planning.	The group customized e-communication map, registered geo-spatial information on landslide so that necessary information would be integrated and viewed for decision-making.	Usuda, Nakasu, Sakai, Jamilah Ahmad, Habibah, Chua Kok Hua	50%	To conduct CBDRM and disaster education for 7 remote communities (625 people) along the East-West Highway . To compile the results and produce promotional and educational materials. To integrate these materials and the results on the e-communication map.
5.5 Enhancing the existing standard operating procedures for water-related geo-hazard management	The group members studied the existing SOP for mainly floods.	Nakasu, Chua Kok Hua	40%	To collect findings as a result of the project activities and make proposal to improve the SOP
5.6 Proposing comprehensive and integrated disaster risk management system of	A prototype disaster management system was produced on a pilot basis.	Sakai Norashidah	30%	To incorporate outputs from other groups into the system

landslide and flood	http://malaysia-map.ecom-plat.jp/map/?cid=8	Rohayu		To promote the prototype of the system to the relevant agencies (e.g., NSC, DID, JKR, MOE, State governments, etc.)

3. RESULTS OF THE EVALUATION BY FIVE CRITERIA

3-1 RELEVANCE

Relevance is judged to be high based on the following reasons.

- Floods and landslides are two major natural disasters that cause human losses and economic damage in Malaysia. For the last ten years (2005 – 2014), floods affected 342,526 people and caused the estimated economic damage estimated of 990 Million US dollars in Malaysia (EM-DAT). According to an estimate made by Chiba University, the economic damage caused by landslides during 1991 and 2003 was more than 100 Million US dollars per year. Therefore, it is valid for the Project to target floods and landslides.
- The Government agencies also prioritize the importance of reducing geo-hazard damage caused by landslides and floods. CKC has developed its master plan for slope management (2009 – 2023) and the development of early warning system and awareness building among residents are emphasized. DID has adopted integrated flood management where early warning system is integral part of response plan and its operation. Therefore, the Project purpose of "A trial system of an advanced disaster risk management system with an integrated data system of landslide and flood is proposed to the relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation" responds to the needs of these agencies.
- The three Malaysian universities participate in the Project. Each university is able to utilize their strengths to implement the Project – USM's focus on research on landslides, UNITEN's focus on research on landslide-related flood events and MMU's focus on remote sensing and image processing.
- Japan's ODA policy towards Malaysia has three pillars; assistance for balanced development, assistance for common interest in the region and cooperation as partners for other regions. Disaster management is included in the second pillar for assistance to Malaysia.

3-2 EFFECTIVENESS

The effectiveness is judged to be moderate.

- At present, Group 2 and 3 are working on the development of models based on the data prepared by G1, and G4 and G5 have not yet completed early warning system. Also, the Project has not yet elaborated the prototype of the proposed disaster risk management system.
- The Project is not yet able to promote the system to such potential users as NSC, DID, JKR and TNB; however, the mid-term review team confirms that DID and JKR are willing to discuss and collaborate with the Project to review and introduce project's outputs such as the advanced landslide and flood models, the improved EWS and the online database. Therefore, it is possible that the project purpose will be achieved within the project duration.

3-3 EFFICIENCY

The efficiency of the Project is moderate.

- The overall project progress is delayed to some extent.
  G1: the activities were delayed due to difficulties to get data to prepare thematic GIS maps. The feasibility of CP/SAR and optical sensor is going to be tested in 2014. The viability of using UAV in Malaysia is still uncertain due to restriction on flight permit.
  G2: Modeling using IFAS is almost complete. The construction of a Mid-resolution 3D hydro-geological model using GETFLOWS is underway, yet high-resolution 3D hydro-geological

modeling has not started due to lack of high resolution data.

G3: Data collected was conducted for Hazard estimation of Malaysia Peninsular. A landslide prediction method was developed and its accuracy being improved. Data are transmitted from the four monitoring stations, yet one of them has problem due to dysfunctional inclinometer.

G4: The activities were also delayed due to delays of outputs from G1, 2 and 3 and not much elaboration of the architecture and communication among data providers and users.

G5: The activities were delayed to some extent due to the same reason as G4. E-communication tool is being tested and discussion with potential users will start from 2014.

In sum, progress is slow-paced mainly due to delayed process of getting data from government agencies and newly installed monitoring stations. This affected the entire work schedule because each component is interlinked with other components. One factor in the background for the delay was insufficient time spent and opportunity provided for substantial discussion by both sides to expedite project progress. Especially the dispatch of Japanese experts was too infrequent to facilitate project progress.

- In terms of inputs, training in Japan appears to be effective for specific training (e.g., learning IFAS and RS data processing and CP/SAR). Through training in Japan, the Malaysian researchers have good exposure to the member universities and research institutes in Japan and built rapport with them. But training should be used for detailed research planning, discussion on specific issues related to project activities and follow-through activities to produce tangible outputs for the latter half of the project duration.
- The budget support by the Malaysian side was a significant contribution to expedite project activities as shown in 2-1-2.

3-4 IMPACT

The prospect of impacts is potentially high because of the following facts and reasons:

- The expected Project's benefits in terms of social application include the improvement of the existing early warning system of the government agencies and the improved accuracy of geo-hazard risk assessment that can be utilized for disaster risk management planning from the national to the local level. It is early to evaluate to what extent the Project would generate such expected benefits, as the proposed system is not yet completed.
- The e-communication tool will be field-tested for the aboriginal communities and schools located in remote areas. The use of the tool can be promoted to other communities and schools where access to disaster risk information is very limited after the tool's effectiveness is proved.
- The Project's contribution to academic development and human resource development are as follows:
  - ✓ The Project organized "the international seminar on landslide research: Malaysia – Japan" in November 2013 where 27 researchers both from Malaysia and Japan presented their results of project activities. The seminar was participated in by 33 researchers mostly from the three universities (13 from USM, 10 from UNITEN, 2 from MMU, 3 from Japanese side and 5 staff members). The abstract of the papers was published and the compilation of all the papers will be published before April 2014. Another seminar is expected before the end of the Project duration to present the prototype of an advanced disaster risk management system with an integrated data system of landslide and flood to the relevant government agencies.
  - ✓ To date, the Malaysian researchers have contributed six articles (including two indexed journals) and presented 29 proceedings (26 for international and 3 for national conferences).

- 13 graduate students (3 Ph.D. and 10 M.Sc. students) and 2 undergraduate students have participated in research activities under the Project as research assistants.
- The Project has helped ties between Japanese and Malaysian universities. Memorandum of Understanding (MOU) was signed between the University of Tokyo and USM in 2011, Chiba University and UNITEN (the faculty level) in 2011 and Chiba University and USM in 2012. Two researchers from UNITEN are studying in Ph.D. program in Chiba University and the University of Tokyo. One more student from MMU will be also studying in Ph.D. program in Chiba University.

3-5 SUSTAINABILITY

The prospect of sustainability is judged to be moderate based on the following reasons.

- The financial sustainability is moderate. During the project duration, the Ministry of Higher Education provides substantial financial support to the three universities. After the project duration, each university needs to make further efforts to obtain competitive research funds (e.g., RU grant, long-term research grant, science research fund) to maintain the current level of research activities, taking advantage of the technologies transferred from the Japanese researchers and ties with Japanese universities.
- The technical sustainability is high. The three universities are competent and accepted as research universities. Through technology transfer from the Japanese researchers to the Malaysian researchers, the counterparts from the three universities will be able to carry out their research work after the project duration.
- The institutional sustainability is high. The three universities have close working relationships with such government agencies as DID and JKR. The Project is discussing with DID and JKR to take specific measures such as forming a taskforce consisting of members from the government agencies and university researchers, and organizing inter-organizational meetings). Such measures would ensure the institutional sustainability.

4. CONCLUSIONS AND RECOMMENDATIONS

4-1 CONCLUSIONS

The conclusion of the evaluation is summarized as follows:

Criteria	Evaluation Results
1. Relevance	Relevance is high as the Project responds to the needs of the population and the Government policies. The counterpart organizations are appropriate to implement the project activities.
2. Effectiveness	The effectiveness is judged to be moderate. It is possible to produce tangible outcomes that would be reviewed and/or introduced by prospective users.
3. Efficiency	The efficiency of the Project is low to some extent. Particularly project management needs to be strengthened to facilitate the dispatch of experts and involve the counterparts in project activities more extensively.
4. Impact	The prospect of impacts is high as there are potentials that the project's outputs would be utilized by government agencies to improve EWS and other outputs for disaster risk management.
5. Sustainability	The overall sustainability is moderate. The institutional and technical

	sustainability is high. The financial sustainability needs to be ensured by getting research funds after the project duration.

4-2 RECOMMENDATIONS

The mid-term review team makes the following recommendations based on the results of the mid-term review:

- To accelerate project activities through the increased guidance and support by the Japanese researchers in Malaysia to complete all the project activities and produce good outcomes in two years.
- In order to monitor project progress and follow up on activities specified in the modified plan of operation, to organize a regular meeting in Malaysia participated in by group leaders and the project coordinator.
- To actively participate in the Project's website where all the group members can see project progress made by other group members.
- To conduct training in Japan as a follow-through activity to facilitate project activities (For example, the participant brings all necessary data for data processing, testing or verifying a model or developing a tool in Japan.) and discuss with the Japanese researchers for the presentation and publication of their research results.
- To organize the final seminar to present the prototype of an advanced disaster risk management system with an integrated data system of landslide and flood to the relevant government agencies before the end of the project duration
- To clarify the specifications of all the necessary data for G1, 2 and 3, decide how to obtain such data, monitor progress periodically and report to JICA and the relevant government agencies for further action.
- To ensure that all the papers for the first international seminar held in November 2013 will be collected from the researchers and published before the end of April 2014.
- To organize regular meetings with relevant government agencies to report project progress and promote project's outputs. To form two taskforces (one by UNITEN and DID researchers and the other by USM and JKR) to facilitate the utilization of the project's outputs
- To promote the state government to provide support to the target communities and schools to continuously use the e-communication tool.
- To make preparations to generate research fund to continue the research activities carried out during the project duration, including proposals to seek joint research with the Japanese researchers.

Annex 1

MASTER PLAN

NOTE:
2nd revised Master Plan is agreed on 3rd JCC Meeting held on 6 March, 2014, which are described as Italic type in the activity 3-1 and 4-5.
This Master Plan will be reviewed and revised, when necessity arises in the course of implementation of the Project.

PROJECT PURPOSE

A trial system of an advanced disaster risk management system with an integrated data system of landslide and flood is proposed to the relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation.

Indicators

1. The landslide/flood models are reviewed by the government agencies for incorporating in their research or actual hazard risk management.
2. The EWS is reviewed by the government agencies for full or partial adoption to improve their existing warning system.
3. The disaster reduction online database is reviewed by the government agencies for update and improvement of their existing database.

OUTPUTS

1. Construction of analysis system for temporal change and real-time condition of surface environment by using RS/GIS technologies.

   Indicators

   1-1. Sets of high-quality DEM covering target research sites are prepared.
   1-2. The method using multi-temporal spatial datasets is developed.

2. Construction of comprehensive advanced numerical flood-runoff models of wide geographical coverage and ones with high resolutions in the Kelantan river basin.

   Indicators

   2-1. The flood analysis model for the Kelantan River basin is built based on IFAS.
   2-2. The flood-inundation 3-D models with mid-and high-resolutions for the Kelantan River basin are built based on GETFLOWS.

3. Construction of landslide hazard assessment system with considering the impacts of precipitation condition and infrastructure development in Malaysian locality.

   Indicators

   3-1. Site-adapted 2D/3D physical models are developed.
   3-2. Warning information is provided based on observations by landslide monitoring stations.

4. Construction of comprehensive disaster information database including satellite observation data, flood/ landslide hazard data and disaster mitigation information.

   Indicators

   4-1. Landslide/flood hazard information system is built.
   4-2. Disaster reduction online database is built.

5. Trial proposal of risk management system of flood/landslide disaster aiming at effective utilization of risk information in local government and community.

   Indicators

   5-1. Web-based EWS for landslide/flood hazard is operated in trial basis for selected monitoring area.
   5-2. Web-based risk communication tools to improve the interface between local government and

community are provided.

ACTIVITIES

1.1 Collection of the natural environmental data such as geological data and meteorological data, the social environmental data such as social infrastructure, population distribution, economic growth, and the data of the disaster occurred in the past
1.2 Construction of high-quality DEM using RS technologies for landslide/flood analysis
1.3 Development of a method to estimate flood/landslide hazardous area from multi-temporal spatial datasets
1.4 Risk calculation of each mesh using the evaluation value of the factor extracted from each element data and ranking of the factor with weight values
1.5 Feasibility studies on CP/SAR and optical sensor mounted on UAV to be used in the near future
1.6 Evaluation of the extracted flood damage and the landslide region by the result of the disaster history and the simulation models

2.1 Field data acquisition and processing/arrangement for database in the Kelantan River basin and the Dungun River basin
2.2 Construction of a wide geographical coverage flood model based on IFAS in the Kelantan Riverbasin and the Dungun River basin
2.3 Construction of a Mid-resolution 3D hydro-geological model (M3DM) and extraction of risky locations for flood and landslide by judging from the condition of water, topography and geology in selected area
2.4 Construction of a high-resolution 3D hydro-geological model (H3DM) based on the M3DM extracting flood/inundation prone areas in Kota Bharu, Kelantan
2.5 Comparison of IFAS and GETFLOWS model with atmospheric based model currently developed in the Kelantan River basin

3.1 Hazard estimation of Malaysia Peninsular (large area) with statistical analysis through past landslide and satellite information

Amendments:

3.1 Hazard estimation of Malaysia Peninsular (large area) with statistical analysis through past landslide and *related* information
3.2 Development of landslide prediction method based on 2D/3D physical models with hydrological analysis
3.3 Installation of landslide monitoring stations and study on setting of criteria of warning information
3.4 Hazard estimation of the monitoring areas with proposed numerical analysis method

4.1 Integration of all collected data with time and spatial indicators in a kind of relational database, mainly through GIS processing
4.2 Construction of landslide information system (hazard maps, sustainability maps and inventory maps in each scale are collected)
4.3 Establishment of flood hazard information system using numerical and statistical analyses by IFAS and GETFLOWS (M3DM & H3DM) with historical, in-situ and/or any other equivalent hydrological & meteorological datasets
4.4 Construction of the database for disaster risk management, mitigation, disaster education and emergency response
4.5 Contribution to the development of disaster reduction hyper-base (DRH) established by NIED for the purpose of visibility at international level

Amendments:

4.5 *Deleted.*

5.1 Assessment of current water-related geo-hazard management system at the related government agencies in Malaysia
5.2 Planning of early warning method (hazard map using real time data) of flood/landslide by

numerical analysis with regional characteristics and demands

5.3 Experimental installation and operation of comprehensive early warning system (EWS) for local potential flood and landslide hazard of monitoring area

5.4 Providing disaster risk communication tools to improve the interface between local government and community through disaster education, decision making and emergency response planning.

5.5 Enhancing the existing standard operating procedures for water-related geo-hazard management

5.6 Proposing comprehensive and integrated disaster risk management system of landslide and flood

Annex 2

The schedule of the mid-term review in Malaysia

Date	Activities
Feb. 18	Meeting with JICA Malaysia Office, Meetings with UNITEN researchers
Feb. 19	Meetings with UNITEN researchers
Feb. 20	Meetings with MMU researchers
Feb. 21	Meetings with MMU researchers
Feb. 22	Review of relevant documents
Feb. 23	Moved from KL to Penang
Feb. 24	Meetings with USM researchers
Feb. 25	Meetings with USM researchers
Feb. 26	Discussion with the project coordinator, supplemental interviews to USM researchers
Feb. 27	Compilation of data collected from interviews, questionnaire and secondary information
Feb. 28	Report writing
March 1	Report writing
March 2	Report writing
March 3	Site visit to pilot monitoring stations installed along East West Highway, moved to KL
March 4	Meetings with DID and JKR
March 5	Discussion on mid-term review report
March 6	Presentation of the mid-term review at JCC
March 7	Reporting to MOE, JICA Malaysia Office and the embassy of Japan

Annex 3

The list of Malaysian and Japanese researchers participating in the Project

Name	Organization	Position	Group
Josaphat Tetuko Sri Sumantyo	Chiba Univ	Professor	G1
Hiroyuki Obanawa	Chiba Univ	Project Assistant Professor	G1,G4
Masanao Hara	VTI	Representative director	G1,G4
hiroyuki Tosaka	Univ. of Tokyo	Professor	G2
Kenji Sasaki	Univ. of Tokyo	Project Researcher	G2
Yoichi Iwami	ICAHRM	Senior Researcher	G2
Seishi Nabesaka	ICAHRM	Researcher	G2
Mamoru Miyamoto	ICHARM	Researcher	G2
Naoki Sakai	NIED	Senior Researcher	G3.G5
Hazarika Hemanta	Kyusyu Univ.	Professor	G3.G5
Koki Ou	Kyoto Univ.	Assistant Professor	G3.G5
Satoshi Murakami	Ibaraki Univ.	Associate Professor	G3.G5
Hiroshi Fukuoka	Kyoto Univ.	Associate Professor	G3.G5
Tomofumi Koyama	Kyoto Univ.	Assistant Professor	G3.G5
Tomohiro Ishizawa	NIED	Researcher	G3.G5
Toshikazu Morohoshi	NIED	Researcher	G3.G5
Yuichiro Usuda	NIED	Senior Researcher	G3.G5
Tadashi Nakasu	NIED	Researcher	G5
Agustinus Deddy Arief Wibowo	MMU	Research Officer	G3
Aiman Ismail	UNITEN	Lecturer	G1,G5
Alireza Bahiraie	USM	Researcher	G3
Aminah Shakirah Jaafar	UNITEN	Master Student	G2
Anton Abdulbasah Kamil	USM	Associate Professor	G3
AP Dr Salman Yussof	UNITEN	Associate Professor	G2
Askuri A. Kadir	USM	Associate Professor	G3
Asnor Mulzan Dato' Hj. Ishak	UNITEN/DID	Principle of Assistant Director	G2
Assoc Prof Dr Lariyah Mohd Sidek	UNITEN	Associate Professor	Leader G2
Azimah Abdul Ghafar	UNITEN	Lecturer	G4
Azwin Zailati Abdul Razad	UNITEN	Research Officer	G3
Bahari Belaton	USM	Associate Professor	G4
Boey Huey Shen	MMU	Research Officer	G1
Chan Huah Yong	USM	Associate Professor	Project Manager & G 4 Leader G1, G3, G5
Chan Yee Kit	MMU	Associate Professor	G1
Cheaw Wen Guey	MMU	Research Officer	G1
Choo Ai Ling	MMU	Research Officer	G1
Chua Fang Fang	MMU	Senior Lecturer	G5
Chua Kok Hua	UNITEN	Principal Lecturer	G4,G5
Chua Ming Yam	MMU	Senior Lecturer	G1
En Halil Hussin	UNITEN	Senior Lecturer	G4
Fairuz Abdullah	UNITEN	Senior Lecturer	G4,G5
Faizah Che Ros	UNITEN	Lecturer	G2, G4

Faten Syaira Binti Buslima	UNITEN	Research Engineer	G3
Fathoni Usman	UNITEN	Senior Lecturer	G3, G4
Gobi Vetharatnam	MMU	Senior Lecturer	G1
Habibah Lateh	USM	Associate Professor, Dean	Project Director G3 Leader G5
Hanafi Yusof	UNITEN	Research Officer	G3
Haw Su Cheng	MMU	Associate Professor, Deputy Dean	G4
Hazlinda Hakimie	UNITEN	Lecturer	G5
Hidayah Basri	UNITEN	Lecturer	G1,G2,G5
Hj Abdul Hafiz Mohammad	UNITEN/DID	Assistant Director	G2
Hj Mohd Roseli Zainal Abidin	UNITEN/DID	Director	G2
Hjh Paridah Anun Bte Tahir	UNITEN/DID	Deputy Director	G2
Ho Chin Kuan	MMU	Associate Professor, Dean	G 5 Leader G3
Intan Nor Zuliana Baharuddin	UNITEN	Lecturer	G1,G3
Intan Shafinaz Mustafa	UNITEN	Lecturer	G5
Izham Mohamad Yusoff	USM	Senior Lecturer	G1
Jainambu M. D Mohd Sultan	USM	Research Officer	G5
Jamilah Ahmad	USM	Associate Professor, Dean	G5
Kanesaraj Ramasamy	MMU	Research Officer	G5
Khairil Imran Ghauth	MMU	Senior Lecturer	G5
Khiruddin Abdullah	USM	Associate Professor	G1,G3
Koay Swee Peng	USM	Consultant Associate	G3,G4,G5
Kok Kah Hoong	UNITEN/DID	Engineer	G2
Koo Voon Chet	MMU	Professor	G1
Lariyah Mohd Sidek	UNITEN	Associate Professor	G 2 Leader G1, G5
Lee Loong Wei	MMU	Research Officer	G1
Lee Yung Chong	MMU	Research Officer	G1
Lim Chee Siong	MMU	Lecturer	G1
Lim Chut Hun	MMU	Senior Lecturer	G1
Lim Tien Sze	MMU	Senior Lecturer	G 1 Sub Leader, G3
Livia Binti Lahat	UNITEN/DID	Assistant Director	G2
Marine Md Din	UNITEN	Lecturer	G4
Md Zaini Jamaludin	UNITEN	Associate Professor	G4, G5
Mohamad Faizal Ahmad Fauzi	MMU	Associate Professor	G4
Mohamad Nazri Ibrahim	USM/JKR	Assistant Engineer	G3
Mohammad Muqtada Ali Khan	USM	Lecturer	G3
Mohd Aminur Rashid Bin Mohd Amiruddin Arumugam	UNITEN	Senior Lecturer	G2
Mohd Firdaus Bin Md Alip	UNITEN	Research Engineer/ Phd Students	G1
Mohd Izzat Hanafiah	UNITEN	Research Engineer/ Master Student	G3
Mohd Syamzari Zulkarnain	UNITEN	Research Engineer/ Phd Students	G1
Mohd Zafri Baharuddin	UNITEN	Senior Lecturer	G1

Muhamad Hafiz Ishak	UNITEN	Master Student	G2
Muzad Bin Mohd Fared	UNITEN	Senior Engineer	G3
Nazirah Azizat	USM	Research Officer	G1
Noor Bahirah Binti Hussin	UNITEN	Lecturer	G4
Nor Azura Othman	UNITEN/TNBR	Research Officer	G1
Nor Hazwani Nor Khalid	UNITEN	Research Engineer	G3
Norashidah Md Din	UNITEN	Professor, Deputy Dean	G 4 & 5 Sub Leader G1, G3
Norhidayu Kasim	USM/JKR	Assistant Director	G3
Nuriah Abd Majid	USM	Ph.D student	G1, G3
Nurul Asyikin Bte Mohamed Radzi	UNITEN	Senior Lecturer	G1
Rasyikin Roslan	UNITEN	Tutor	G1
Redia Redzuwan	UNITEN	Research Engineer	G5
Rohayu Che Omar	UNITEN	Senior Lecturer	G 1 Leader G 2 Sub Leader G3
Ruzanna Ahmad Zahir	UNITEN/DID	Assistant Director	G2
Salman Yussof	UNITEN	Senior Lecturer	G4
Sarveswaren A/L Karunanithi	UNITEN	Lecturer	G4, G5
Sazwan Shaharuddin	UNITEN	Research Engineer/ Master Student	G3
Soon Lay Ki	MMU	Senior Lecturer	G3,G4
Suhaimi Jamaludin	USM/JKR	Senior Assistant Director	G3
Tan Tien Ping	USM	Senior Lecturer	G4
Tan Wei Qiang	MMU	Research Officer	G1
Tan Wooi Nee	MMU	Lecturer	G3
Tay Lea Tien	USM	Senior Lecturer	G1, G3
Wan Hazdy Wan Azad bin Wan Abdul Majid	UNITEN/DID	Assistant Director	G2
Wan Mohd Muhiyuddion Wan Ibrahim	USM	Lecturer	G1, G3
Y.Bhg. Dato' Ir. Hj. Hanapi Mohamad Noor	UNITEN/DID	Director	G2
Yee Kuo Shen	MMU	Research Officer	G1
Zailani Ibrahim	UNITEN	Lecturer	G4
Zarina Mohd Nor	USM	Lecturer, Deputy Dean	G5

Annex 4

The list of main equipment procured for the Project

Original	Equipment	Installation	Arrival Date
	(JPY2011)		
Japan	Antenna Control Turbo	MMU	20111215
Local	PC for Data Center	USM, UNITEN	20120314
Local	PC for Flood Analysis	UNITEN	20120320
Japan	GETFLOW License Manual	UNITEN	20120329
Local	Storage for Data Center	USM	20120606
Local	Serve for Data Center	USM	20120710
Local	PC for flood Analysis	UNITEN	20120712
Local	Landslide Modeling Process system	USM	20120718
Japan	FPGA Board	MMU	20120718
Japan	IP2421(Wireless Data Link)	MMU	20120731
Local	SAR Process Module	MMU	20120809
Japan	Slope Observation System	East-west Highway	20120831
Japan	1270 Transceiver Module	MMU	20120831
Japan	Satellite Data(JERS-1/SAR)	USM/UNITEN	20121106
Japan	Satellite Data(JALOS/PALSAR)	USM/UNITEN	20121106
Japan	Remote Sensing Software (ERDAS IMAGINE Professional License)	USM/UNITEN	20121106
Japan	GIS Software(ArcGIS License)	USM/UNITEN	20121106
Japan	Portable Direct Shear Apparatus	USM	20121106
Local	Soil Auger	USM	20121119
Local	Soil Resistance Meter	USM	20121119
Local	PC for Satellite Picture Analysis		20130205
Local	PC for Satellite Picture Analysis	MMU	20130220
	(JFY2013)		
Local	PC	USM	20130621
Local	Warning Analysis System	USM	20130713
Local	CP-SAR Subsystem	MMU	20130625
Local	PC, Monitor and External Hard Dusk	USM	20130713
Local	One Board CPU	MMU	20140126
Local	Landslide Monitoring System (East-West Highway)	USM	201403,Scheduled
Local	Flood Monitoring System	UNITEN	201403,Scheduled
Local	Landslide Monitoring System (Kerantan)	UNITEN	201403,Scheduled