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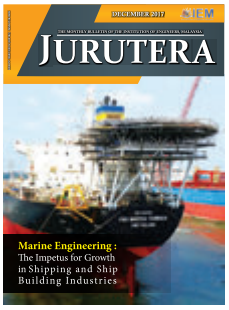

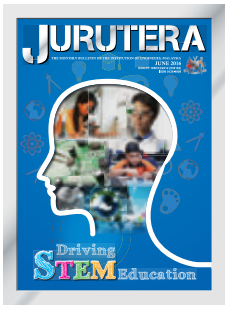

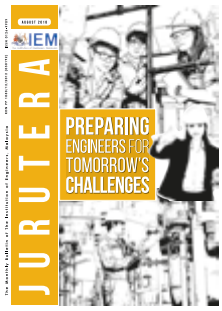

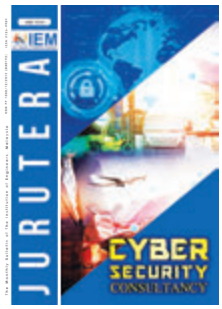

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COVER *Note*

by Ir. Razmahwata Mohamad Razalli
Principal Bulletin Editor

Mea Culpa

Per ardua ad astra. Due to a series of unfortunate events, the March 2024 edition of the *JURUTERA* was headed by the *JURUTERA* Editorial Board. I would like to thank the Committee of the Position Paper on The Impacts of Sea Level Rise on Coastal Communities & Development in deigning to be interviewed for the Cover story and all other contributors to this edition. The IEM Secretariat has been wonderful in helping put together the bulk of this edition in literally days (and possibly weeks). The Editorial board has been united in providing support and ensuring that content is up to scratch. All shortcomings are on me as the Editor of *JURUTERA* and comments may be directed to myself. ■

EDITOR'S *Note*

by Ir. Razmahwata Mohamad Razalli
Principal Bulletin Editor

IEM Maintenance and Facilities

IEM maintenance & facilities team

IEM HQ has 2 buildings – one houses the Secretariat and facilities for meetings while the other is used mainly as a venue for IEM activities and events. The IEM Maintenance & Facilities team, consisting of nine dedicated individuals, oversees the upkeep of both buildings and the facilities required for IEM operations. These individuals are the unsung heroes who often work beyond regular office hours and late into the night, even on weekends and public holidays to ensure everything runs smoothly. ■

Impact of Sea Level Rise *on Coastal Communities and Development*

Interviewees:
Dato' Ir. Nor Hisham Mohd Ghazali
Ms. Nor Aslinda Awang
Ir. Jaflus Abdul Jalil
Ir. Iwan Tan

Global warming accelerates the rate of sea level rise, causing increasing concerns over coastal development and the capability of communities to live under the threat of such conditions. JURUTERA's Ir. Razmahwata Razalli, a member of IEM's Engineering Competency Development Sub-committee, gets the views of four members of a panel of experts involved in the preparation of IEM's Position Paper on the Impacts of Sea Level Rise on Coastal Communities and Development.

Climate change is inevitable and it impacts our world in big and small ways. Powerful effects of climate change include the frequency and intensity of storms, floods, heatwaves and droughts. It is crucial to note that "every fraction of a degree of warming makes a big difference" in how powerful the effects will be. Thus, every action taken to limit further warming will make a big difference, particularly for vulnerable communities around the world.

Among those at the forefront of mitigating the effects of climate change is the United Nations' Intergovernmental Panel on Climate Change (IPCC), a scientific group that monitors and assesses all global science related to climate change.

Eastern and northern coast of Sabah experienced higher rates of sea level change.
- NAHRIM

IPCC produces reports that focus on different aspects of climate change. Its 6th Synthesis Report, released last year, covered the latest climate science, the threats the world population is already facing today from climate change and what we can do to further limit temperature rises and the dangers to the whole planet.

Malaysia is not spared from the impact of climate change. One of the most significant effects of global warming impacting our country is the rise in sea level, resulting in an increase in tidal inundation, propagation of storm surge and the magnitude of waves and currents forcefully driving erosion and sedimentation. In addition, storms, erosion and accretion act together with changes in sea level to shape the size and makeup of our coastlines, wetlands and rivers. As coastal changes accelerate upon sea level rise, 8,840 kms of the coastline, inhabited by 70% of our population of 30 million, will immediately lose a portion of its intertidal land to the sea.

Accelerated rates of sea level rise can cause inundation of low-lying land, saltwater intrusion into groundwater and streams as well as an increase in the extent and severity of coastal flooding, as highlighted in the IEM Position Paper on the Impacts of Sea Level Rise on Coastal Communities and Development. It is a matter of grave concern that affects not only coastal development but also communities along the coastal line.

Concerned about the devastating impacts of sea level rise, IEM formed a panel to state its position regarding the issue and released its Position Paper on this subject matter in 2022. The panel comprised experts on the subject matter, namely Dato' Ir. Nor Hisham Mohd Ghazali (who chaired the panel), Ir. Jaflus Abdul Jalil, Ir. Iwan Tan Sofian Tan, Ms. Nor Aslinda Awang, Prof. Ahmad Khairi Abdul Wahab, Ir. Mohd. Radzi Abd. Hamid and Ir. Norzana Mohd. Anuar.

In this article, Dato' Ir. Nor Hisham, Ir. Jaflus, Ir. Iwan Tan and Ms. Nor Aslinda share the panel's findings and other pertinent information which form the basis for IEM's stand on the issue in this article. The paper states IEM's understanding of the potential impacts of sea level rise on our coast and its implications on engineering and engineers. It also acknowledges the demands of sustainable development and engineering solutions that must not negatively impact the natural environment. This is a technical challenge for IEM members. The paper also recommends pragmatic measures to improve the quality, safety and integrity of coastal and maritime structures for long-term effectiveness against hazards caused by sea level rise.

Coastal Zone Vulnerability

Dato' Ir. Nor Hisham says the National Water Research Institute of Malaysia (NAHRIM) is the nation's focal point for climate change research, adding that it has been conducting studies on sea level rise for nearly a decade.

"The studies established that there had been a steady increase in sea level rise since 1993 and that the East Coast of the peninsula was particularly susceptible to the impacts of rising sea level. Generally, low-lying areas and beaches which are flat or have gentle shore fronts are threatened by sea level rise. Islands which are very flat will also face the severe threat of sea level rise in the next 100 years. It is a significant

concern especially in low-lying and vulnerable unprotected sediment areas," he says.

Elaborating on our coastal zone vulnerability in relation to sea level rise, Ms. Nor Aslinda says historical sea level data showed steady increases since 1993. The lower sea level is located in open ocean areas, with an increase of approximately 2-3 cm/decade, whereas the sea level records a greater incremental trend of 3-5 cm/decade near the shore areas. Significant coastal erosion has occurred in the East Coast of Peninsular Malaysia as it faces the South China Sea, where waves are stronger, especially during the monsoon season. West Coast states are more vulnerable to coastal inundation risk, in-depths and inland inundation distances during Mean Higher High Water (MHHW) with sea level rise and storm surge. She adds that these findings from research conducted by NAHRIM highlight the need for coastal management and planning strategies to mitigate the impacts of sea level rise in vulnerable areas.

Result analysis of the sea level rise projection study in 2019 by NAHRIM along the coastline showed that the eastern and northern coast of Sabah experienced higher rates of sea level change compared to that in the Straits of Malacca. The coastal areas of Sabah and the northeastern coast of the peninsula exhibited

faster sea level rise compared to other regions. Overall, the sea level rise projection on mid-range value due to worst expectation scenario (business as usual) RCP 8.5 in year 2100 for Peninsular Malaysia, Sarawak and Sabah are 0.67-0.71mm, 0.71-0.72mm and 0.72-0.74mm, respectively.

"That's the situation in general. Sea level rise also brings with it other issues, such as erosion and, with higher water levels, there is greater wave penetration. The rise in sea level and the increase in the threat of wave erosion will affect coastal infrastructure," says Dato' Ir. Nor Hisham.

Ir. Iwan Tan says that since the IEM panel started work on the Position Paper in 2022, NAHRIM had updated the values of change or increase in the sea level rise. Now it is between 0.4m and 0.9m up to 2100. He says there has been an increase due to the adjustment and updates made in IPCC's 6th Assessment Report (AR6).

Key Indicators & Metrics

Dato' Ir. Nor Hisham says that currently, Malaysia uses tide gauge and satellite altimetry data which record the sea level of a location or region involved in order to observe and monitor the coastal zones due to sea level rise. "This is done over a long period of time and NAHRIM has been doing this for nearly 10 years. We use the data to establish the rate of sea level rise over the years and, every time there is a review at the IPCC level released in assessment reports, NAHRIM will act on it to come up with the local analysis on the changes."

Current study data sets for tide gauges at our coastlines are obtained from the Permanent Service for Mean Sea Level (PSMSL) at 21 stations around the country. Data from these sources are processed and simulated before they are integrated into a Geographic Information System (GIS) platform for developing a coastal inundation risk map. There are various primary indicators used to assess sea level rise impact, including impacts on communities, infrastructure and protection structure.

"NAHRIM has been at the forefront of updating sea level rise projections in accordance with the most recent IPCC assessment report. The output and information of the study on the impact of sea level rise and on areas vulnerable to coastal flooding are disseminated via its MyCoast NAHRIM portal and through state involvement via roadshow programmes on the presentation of NAHRIM's research and development," says Ms. Nor Aslinda.

Ir. Iwan Tan says: "Vulnerability of a coastline subjected to sea level rise can be measured through these components – physical, biological, social and economic vulnerability. Each component has various vulnerability and capacity factors and index parameters."

He explains that there is the National Coastal Vulnerability Index (NCVI) produced by PLANMalaysia (Department of Town and Country Planning under the Ministry of Housing & Local Government) that is applicable to coastlines in Peninsular Malaysia and Labuan but not to Sabah and Sarawak which have different Planning Acts.

"NCVI gives a very good indication of sea level rise impact. Each affected district facing the Straits of Malacca or the South China Sea will update their NCVI in their local plan," he says.

Enhancing Resilience of Coastal Infrastructure

According to Dato' Ir. Nor Hisham, numerous measures and initiatives are being implemented to strengthen coastal infrastructure resilience. It is important to first know that different parts of our shoreline will face different problems; some experience tidal inundation, while some experience intensive wave attacks and serious erosion.

"These problems are compounded when these areas lose their natural protection, such as mangrove belts, resulting in the increase of vulnerability and, with the threat of sea level rise, we have to look at site-specific designs and introduce factors that can increase resilience to the impacts of sea level rise," he says.

Ir. Jaflus says that engineers and the general public must realise that generally 50% of the soil on the West Coast of the peninsula is very soft, with a high level of marine clay. In the East Coast as well as Sabah and Sarawak, the soil is more sandy and more susceptible to waves rather than the geo-technical condition in the West Coast. So, he says, it is important that engineers design according to the specific soil condition of an area.

Ms. Nor Aslinda says NAHRIM has issued the recommended approach and strategy that are best suited for identifying difficulties and gaps in resilience planning and assessing the success of adaptation initiatives. In terms of research output for coastal development, she urges researchers, engineers and the federal/local authorities to refer to NAHRIM's Coastal Inundation Risk map, Malaysian sea level rise projection and sea level rise manual to improve coastal inundation assessment under various sea-level rise scenarios and time horizons, which provide a full vulnerability assessment. In addition, it is advisable to consider the dynamic adaptation pathway (more than one adaptation use) in coastal design, coastal management, future coastal development and national disaster action plans to enhance the resilience of coastal infrastructure.

"These best practices will contribute towards building a more resilient coastal strategy by incorporating climate projections, understanding system characteristics and considering the social and economic dimensions of coastal communities," she adds.

Dato' Ir. Nor Hisham says engineering practices play a crucial role in building resilient coastal structures which can withstand the impact of sea level rise. He reiterates that there are several ways engineering practices can contribute to resilience, including making site-specific designs and understanding local conditions, such as soil type, wave pattern and storm surge risk.

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Monetary impact of sea level rise should be the centre of attention.

- NOR ASLINDA

Any protection structure should be designed based on the specific needs and vulnerabilities of the location, taking into consideration factors such as topography and local ecosystems.

Other ways are meeting elevation and setback requirements as well as integrating natural defences such as mangroves, dunes and wetlands into engineering designs to provide additional protection against storm surges and erosion and to restore or create natural features which act as barriers that can absorb the energy of waves.

"What engineers can also do to enhance the resilience of the shoreline is to look at innovative protection design, especially the use of materials that are climate resilient. Typical materials used are rocks and concrete units but in the future we may have to look at other materials which can be used on shorelines which will be light and can provide the required protection. On the aspect of building with nature on the shoreline, the amount of protection is to save it and we may have to come up with a way to work around nature and to accommodate some of the natural erosion and use whatever is available on the shoreline as a buffer," suggests Dato' Ir. Nor Hisham, adding that the other equally important factor in increasing resilience is to enforce the Malaysian standard of having a 60m setback from the high-water line.

"The further you are from the high-water mark, the safer you will be from storms coming in from the sea. So, a combination of hard structures, innovative design and nature as well as prudent use of the shoreline in terms of development setback are ways that we can move forward and reduce our coastal vulnerability," he says.

Also important is community engagement and education where local communities will be involved in the planning and design process to ensure that engineering solutions align with their needs and concerns. Other measures include the recommendation to adopt Integrated Coastal Zone Management (ICZM) approaches which consider the inter-connectedness of coastal systems and which involve multiple stakeholders in decision-making and engagement with policymakers to advocate for the integration of resilient design principles into coastal development regulations and building codes as well as support the development and implementation of policies that encourage sustainable engineering practices.

"For me, it boils down to understanding why sea level rise is happening and what the components are. There are currently six driving components to mean sea level change in Malaysia, i.e. Antarctic and Greenland ice sheets, glaciers, land water storage and ocean sterodynamics. Mass changes in the Antarctic ice sheet are projected to likely contribute most significantly to the projected sea level rise," says Ir. Iwan Tan.

He adds that adaptation to climate change generally falls into two categories: Reactive and planned. Reactive responses happen after impacts occur and these include rebuilding structures to be more resilient or buying out damaged land. They often involve structural solutions. Building with nature, such as replanting mangroves or nourishing beaches, is increasingly popular.

Planned adaptation is proactive, involving advance planning to mitigate negative consequences from natural hazards. It includes non-structural solutions such as land-use measures to make development more resilient and to reduce the need for long-term retreat strategies; this can be cost-effective and less environmentally damaging. Integrated Shoreline

Management Plans are an example of pre-emptive measures against coastal erosion. More complex measures may involve infrastructure development and maintenance, considering factors such as population density. Ir. Iwan Tan adds that combining complementary measures is usually more effective than relying on a single approach, contributing to better coastal management and additional benefits in climate change adaptation.

Policy Measures to Manage Sea Level Rise Impacts

Dato' Ir. Nor Hisham states that the policy regarding climate change is already in place. As of the latest update, Malaysia has been addressing coastal zone vulnerability through various policies and initiatives, including the National Coastal Erosion Study (NCES) to understand coastal erosion and vulnerability, which can influence policy decisions. Then there are ICZM approaches, which involve co-ordinated planning and management to address the complex issues in coastal areas, Climate Change Policy and Sea Level Rise Projection. These may include considerations for sea-level rise impacts; NAHRIM has been appointed to develop the sea level rise projection for Malaysia based on the IPCC's latest AR and scenarios used.

"We also have Mangrove Conservation Policy, the Coral Triangle Initiative by the Department of Marine Park Malaysia and Rancangan Fizikal Zon Persisiran Pantai Negara (RZPPN) by PLANMalaysia. However, it's important to note that there may be gaps or challenges in implementing these policies effectively. Some potential gaps include enforcement and compliance to policies and regulations, integration of climate change considerations and community engagement whereby gaps in this aspect may hinder the implementation of policies. In addition, rapid development along coastlines may exacerbate vulnerability. Policies need to balance development goals with the need for sustainable and resilient coastal infrastructure," says Ms. Nor Aslinda.

Dato' Ir. Nor Hisham says: "I must also mention that some of the efforts require the integration of actions of other sectors especially those involving development along the shoreline. Sector policies may differ, so this calls for integration of policies to solve development policy. Malaysia does not have an integrated natural resources development policy, so we need to look at this and see how we can properly develop natural resources on the shoreline. With the sea level rise threat on the shoreline, this becomes more complex."

He adds that all coastal programmes, especially those of the DID, are cleared at the highest Federal level, which is the Malaysia Water Council.

"The central government provides funds for integrated shoreline management plan and research funds for NAHRIM to conduct studies but the onus to act on recommendations lies with state governments which must accept and embrace the scientific findings and use these in decision-making concerning shorelines. This is a very challenging aspect as we have different state economies, each with its own needs. The co-ordination must happen at the planning stage involving all with the aim to move forward and create a more resilient shore that is able to withstand sea level rise threat," says Dato' Ir. Nor Hisham.

Dato' Ir. Nor Hisham Mohd Ghazali

Chair of IEM's Disaster Risk Reduction Advisory Board (DRRAB) and former Director-General of Department of Irrigation & Drainage and National Water Research Institute of Malaysia.

Ms. Nor Aslinda Awang

Director of Hydraulic & Instrumentation Laboratory, NAHRIM and former researcher in Coastal & Oceanography Research Centre, involved in sea level rise projections, impacts and adaptations as well as mangrove hydrodynamic studies.

Ir. Iwan Tan says: "We can start with a policy that can be used and integrated by all the different states. First, all must acknowledge that sea level rise is a problem and come to a consensus on how to mitigate this problem. We know that decision makers face the challenge of balancing various interests. We hope they are being advised by people who are able to give a balanced view of what is happening. There has to be a balance between development of coastal zone and efforts to address sea level rise problem."

Ir. Jaflus suggests that in policy matters, there should be a department or a ministry that controls policy implementation. He says: "While we want to protect the coastline, we also want to develop it to derive economic benefits, such as from port

development. Efforts involving all relevant government departments and bodies must be co-ordinated properly."

Key Messages and Advice

Says Dato' Ir. Nor Hisham, "The advice I would like to give engineers is to basically accept the fact that climate change is real and that sea level rise is also real and that these phenomena have an impact on engineering and engineering practitioners. We need to be aware of what and how these will affect the work we do and then incorporate the necessary factors to alleviate risks. Sea level rise cannot be ignored and it has to be incorporated in our work, especially at the shoreline.

> Infrastructure in maritime and marine environment is **expensive** because it needs to be resistant to sea water conditions, waves, tides and sea level rise.

All these factors have to be incorporated. As for policymakers, it is important to formulate a holistic approach to address the threat of sea level rise on our coastal zone."

Ms. Nor Aslinda suggests a combination of mitigation and adaptation measures along with the flexibility to connect response changes to measured data and improvements provided by projections. She says researchers should look into other forms of impact that come along as sea level is rising and the nature-based solutions available to protect our coastline. Among other measures, she feels the monetary impact of sea level rise should be the centre of attention in order to address the vulnerability in an orderly manner.

"Perhaps it is also important for us to educate on the causes of sea level rise, even from school level. There is increasing awareness in the world about global warming and the need to use renewable energy, for example. We also need to have certain guidelines to address the current situation of sea level rise," says Ir. Jaflus.

Ir. Iwan Tan says: "We also need an outreach programme to engage with the public at large, not only those living along coastal zones but also in the cities and to inform them how development will affect them and get their responses. Based on these responses, stakeholders may need to make changes to proposed development plans. Everyone must be involved from now or come 2100, improper mitigation planning and action to sea level rise will have disastrous consequences for our country."

In conclusion, Dato' Ir. Nor Hisham says: "Engineering researchers, climate researchers and people in NAHRIM have put in a lot of effort. It will be very beneficial for the government to increase the research budget because we are living in a very bio-diverse region. Integrated research on building with nature, involving specialised engineering and softer sciences, is not cheap. So, the government must put more resources into these types of research because these will determine how well we can defend our coastline in the future." ■

Ir. Jaflus Abdul Jalil

Founder of Arsea Consulting Engineers. Specialises in port design and coastal infrastructure. Served the port section of the Public Works Department.

Ir. Iwan Tan

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Continuous Deflective Separation (CDS) Technology for Urban Water Quality Improvement and Flash Flood Mitigation

In the early 21st Century, Kuala Lumpur and many other cities in Malaysia experienced flash floods on a regular basis after heavy rains. Furthermore, flood water runoff transported a huge volume of gross pollutants from the entire watershed, clogging many of the static trash screens in the urban drainage systems. These trash screens eventually acted as a temporary barrier, preventing flood water from going through and generating flash flooding within a short period of time in urban areas, depending on the intensity of the downpours. In many cases in Kuala Lumpur and Shah Alam, trash screens installed at the secondary drain junctions with the major drains and maintenance work to clear the blocked screens proved insufficient to cope with the frequency of rain, particularly during the rainy season which exacerbated the blockage issues. Thus, the Urban Stormwater Management Manual for Malaysia (Manual Saliran Mesra Alam or MSMA), First Edition, was published in 2001 and made the use of Gross Pollutant Traps (GPTs) as one of the important selections after a 5-year grace period, i.e. in 2006, to replace the malfunctioning trash screens. GPTs treat stormwater quality and reduce flow quantity while maintaining some self-functioning ability. GPTs with the Continuous Deflective Separation (CDS) Technology was then developed and detailed in the MSMA for application in Malaysia.

Gross Pollutant

Gross pollutant is defined as contaminants with a diameter of 5 millimetres or more which, when introduced into an environment, can cause instability, disorder, harm or discomfort to physical systems or living organisms. This may include trash, litter, and vegetation (as illustrated in Figure 1). They can be broadly classified as follows.

- Anthropogenic materials (litter, cigarette butts, polystyrene, plastic bags, newspaper, etc.)
- Natural debris (grass clippings, seeds, leaves, etc.)
- Sediment (fine and coarse sand, etc.)

How Pollutants Behave During and After a Storm

Each type of pollutant has distinct features during a storm and behaves differently both during and after. We will categorise materials to help identify ways to trap them.

- Floatables (20%): Materials that float on water in flowing stormwater (e.g. polystyrene, cigarette butts, leaves, etc.)
- Neutrally Buoyant (60%) - Materials that travel within the water column in flowing stormwater (e.g. grass clippings, leaves, plastic shopping bags, newspaper, etc.)
- Settling materials (20%) - Heavier materials that tend to be carried along at the bottom in flowing stormwater (e.g. sediment, gravel, lumps of wood, broken glass, etc.)

After a storm, when these have had time to waterlog and settle:

- Floatable (3-5%) – Materials that float on the water in flowing stormwater (e.g. polystyrene, cigarette butts, leaves, etc.)
- Settling materials (95-97%) – Heavier materials that tend to be carried at the bottom in flowing stormwater (e.g. sediment, gravel, lumps of wood, broken glass etc.)

When designing and selecting a GPT, one must evaluate what it aims to capture, as well as if it is appropriate for the purpose, fulfills the budget or is based on the best operating cost, hence reflecting the best life cycle cost.

How a GPT Works

The GPTs described below work by function (Figure 2) as follows:

- Floating Traps & Booms. For floating pollutants only (not considered GPT)

Figure 1: Various types of gross pollutants

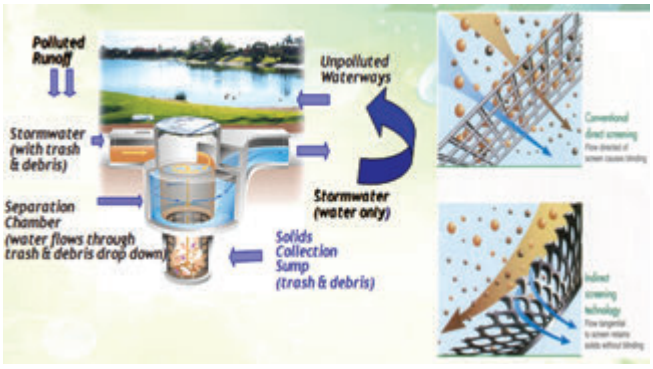

Figure 2: Illustration of GPT works by function and the screening technology

- Overflow/Underflow Devices. Mainly for oil & sediment (grit)
- Direct Screening Devices. Aimed at physical pollutants
- Vortex Separation Devices. Improved version but still no screen
- Continuous Deflective Separation (CDS). For all physical pollutants, including oil and sediment

Continuous Deflective Separation (CDS) Technology

The flow process of CDS Technology (Figure 3) begins with stormwater, which carries polluted runoff into the drainage system, along with trash and debris. A diversion weir converges the flow and diverts it into the CDS separation chamber as a vortex flow. However, a specially designed and patented system of non-blinding screening reverses the flow and returns the filtrated stormwater to the same drain outlet located just behind the weir. This action of deflective separation will continue to work, which stands for continuous separation.

CDS is having an indirect screening technology, which means no blocking with continuous and predictable flow (Figure 4). This allows the use of known modelling parameters. Figure 5 shows a prospective cut off view of a typical offline CDS unit and a top plan view of CDS to show how it works.

Whether it is a retrofit or new construction drainage system, a diversion chamber with a weir is required and a calculation must be performed to determine the weir height for optimal performance of the selected CDS unit in achieving the target quantitative and qualitative treatment, as well as allow for enough weir length for peak flow bypass without causing upstream flooding.

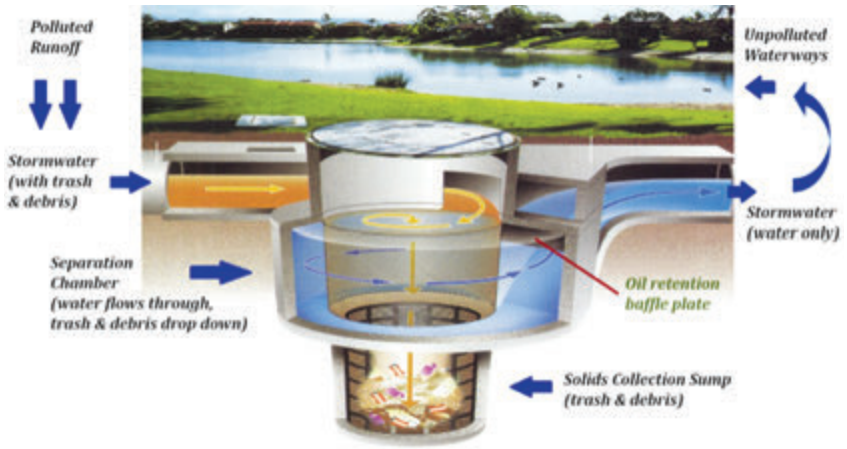

Figure 3: CDS technology flow process

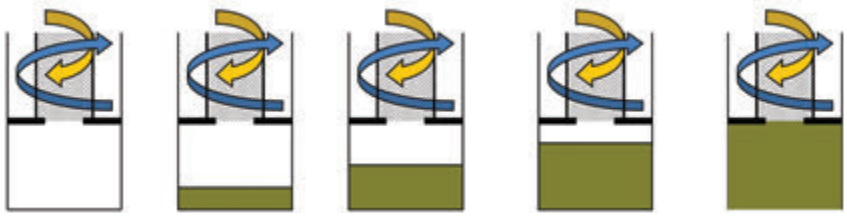

Figure 4: Indirect Screening Technology of CDS

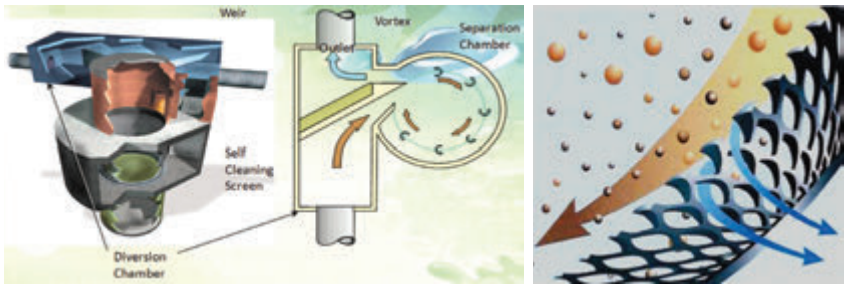

Figure 5 (left): Prospective cut off view of CDS (right): CDS indirect screen

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The CDS screen is configured (Figure 6) with the blind side of the screen mesh facing the direction of flow. The direction of the vortex will sweep the screen surface to prevent plugging action, in addition to hydraulic forces reacting with the non-blinding screen to cause fine particles to become unstable, settle in the centre and then drop to the bottom sump.

In short, the presence of a screen ensures particulate capture, while micro-hydraulics at the screen surface ensures the intended flow rate. Diversion chambers can be designed to handle any flow rate. It is non-powered and low maintenance (no electricity costs). With the addition of an oil baffle plate, CDS tends to skim floating oil. The fact that oil emulsifies when mixed with flow, as well as its tendency to stick to fine particles and become trapped, aids in the indirect removal of oil and grease.

It is also common practice to insert an oil pillow after each emptying of the gross pollutants baskets or to hoover out each load when full, in order to absorb all the oil. Non-blocking patented technology based on vortex forces produces a high rate of physical separation of gross pollutants from stormwater, removing 99% of all gross pollutants, down to 0.1mm.

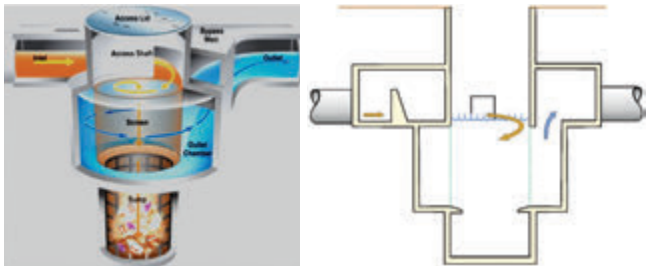

Figure 6: Elevated view of underground CDS unit

Figure 6 shows an elevated view of a CDS unit installed below ground level. This demonstrates that the unit, which is normally installed underground, appears unobtrusive (more aesthetic than a structure protruding above ground). Only the lid is visible at ground level. Stored pollutants are not visible and pollutants are stored in a sump away from the flow path, ensuring almost no re-suspension.

Where CDS Stormwater Treatment is Applied

The first reference project was to use CDS technology for wet markets, specifically in Chow Kit and Sentul, Kuala Lumpur. It was later introduced in the Selayang wholesale market. KL City Hall later approved the CDS filtration system-based sullage treatment plant as an alternative to the conventional system with mechanical raking screen. The plant designed a case study for the Tiong Nam urban area and delivered treated Water Quality Index (WQI) Class IV & V to Class IIB, a standard that can also meet the new water reuse standard. So far, over 500 CDS units have been installed in Malaysia, with a few installed overseas in China, Singapore, and Brunei.

Research continues to be carried out locally to develop more advanced CDS units for rainwater harvesting, stormwater, sullage water and sewer reclamation based on pretreatment by CDS technology, powered by green

energy, i.e. kinetic, to complete the stormwater loop closure to achieve water reuse at the lowest CAPEX and OPEX. Meanwhile, SMART technologies such as AI and IoT are being considered and tested. We hope that, as the first Asian country to develop and research CDS technology, Malaysia will one day become the world's leading CDS technology country.

The following are some applications confirming the pollutant removal efficiency of CDS technology. ■

Pollutant / Items	Removal Efficiency	Independent Reference Source
Suspended Solids (TSS) ≥125µm	70%	CRCCH Report 99/2 Feb 1999
Total Phosphorus (TP)	30%	CRCCH Report 99/2 Feb 1999
Gross Pollutants (>5mm)	98%	CRCCH Report 98/3 April 1998
Sediments >0.215mm	95%	Portland State Uni, Oregon Oct 02
Fine sediments >75 microns	90%	Lousiana State University 2004
Heavy Metals	80%	Lousiana State University 2004
Hydrocarbons, Oil & Grease	82-94%	UCLA Report 1998
Biochemical Oxygen Demand (Total)	88.5%	ICUD Report, University Tenaga Nasional, Humid Tropics Centre Kuala Lumpur, Department of Irrigation and Drainage, 2014
Chemical Oxygen Demand (Total)	93.7%	
Total Suspended Solids	96.8%	
Ammonia as N	74.7%	
Removing flotsams	>95%	PUB website, https://www.pub.gov.sg/Documents/IndirectScreeningforSilt.pdf

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Sabah: Coastal Reservoirs as Alternative Water Storage

Sabah is not running out of water but water is running out of Sabah. What the state needs is a sizeable water reservoir.

Water is the crux for sustainable development. Despite having a copious amount of annual rainfall, Sabah, with a population of approximately 3 million, experiences water stress in major cities, including its capital, Kota Kinabalu. As such, the government has been urged to adopt a pragmatic solution to water storage by exploring innovative methods such as a coastal reservoir. There have been many incidences of water supply disruptions in Sabah since 2022, ranging from raw water inadequacy, quality of potable water, pipeline bursts, unauthorised consumption and unfinished infrastructure projects.

The state government has approved a feasibility study for a water storage dam proposal to mitigate water stress issues. Named Papar Dam, this will be constructed upstream of the Papar catchment, with potential impacts on nature due to the inundation of large areas of forests, social and economic issues among the indigenous population, regular seismic activity and the environment.

Rapid urbanisation requires large amounts of water storage to supply water for the growing cities. As people migrate toward coastlines, megacities gradually emerge in deltaic regions which provides opportunities for large-scale coastal reservoirs.

Recently, Malaysia has seen a paradigm shift in water resources development works from traditional upstream dams to downstream reservoirs. Sabah is a water-rich state and, by improving water resources management as well as adopting the new and innovative approach of coastal reservoirs, the utilisation of raw water resources will ensure sustainable growth, leading Sabah to reach new economic heights.

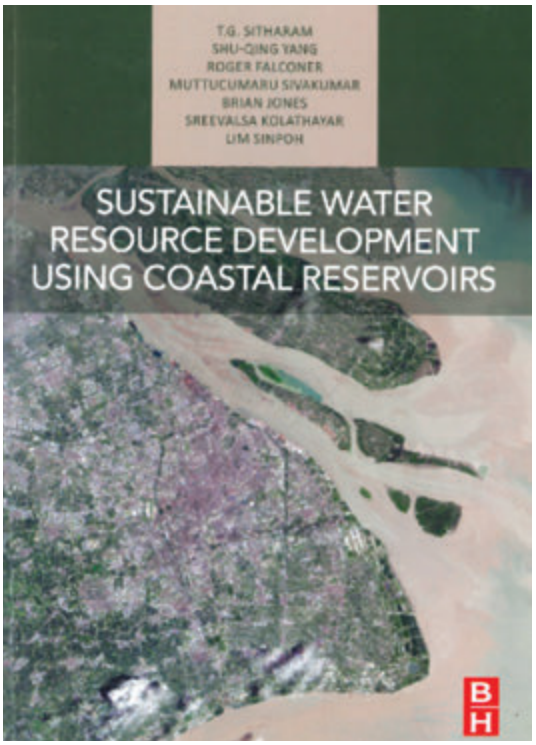
Water resources development by building dams has become less favourable today since it has been portrayed as a contingent liability and a non-environmentally friendly solution. Additionally, there have been strong objections from the public and NGOs in many countries, including Malaysia.

The recent occurrence of earthquakes in Sabah also increased the hazard risk, posing a potential threat to those living downstream from such existing dams. In truth, there are many significant advantages to adopting coastal reservoirs instead of upstream dam reservoirs or other alternate solutions such as desalination plants. Overall, coastal reservoirs are a cost-effective, environmentally friendly, green and sustainable solution for raw water resources development in Sabah and elsewhere in Malaysia.

Downstream Reservoirs in Shanghai & Singapore

The questions often asked are: “Has it been done before? If it is viable, why has it not been proposed before by others?” My answer is: “If we are forever doing what has been done before, then there will be no innovative designs.”

There are many good examples of downstream reservoirs that have been constructed elsewhere in the world. An exemplary one is Shanghai’s Qing Cao Sha reservoir which started operations in 2011, with a reservoir area of about 66 sq km, water storage of 527 MCM and water supply capacity of 7,190 Mld. More details and examples of coastal reservoirs are available in the book, Sustainable Water Resource Development using Coastal Reservoirs, published by Elsevier in 2020.



In Singapore, the latest reservoir plan is for a nearshore reservoir. In November 2023, the Singapore Government announced that technical studies of this reservoir proposal will commence in 2024 and that it will be carried out over the next few years. It will involve land reclamation of 800 ha (size of over 1,000 football fields) and create an enclosed waterbody and eventually, a freshwater reservoir in front of East Coast Park. The new bund is expected to serve as one of the important adaptation measures against rising sea waters, rougher climate conditions and stronger wave and erosion forces due to climate change.

Source: https://www.channelnewsasia.com/singapore/long-island-cna-explains-east-coast-reclamation-property-climate-3950566

Should we build such reservoirs in Malaysia? The answer is "yes", especially for cities located near coastal areas such as Penang, Klang, Melaka, Kota Kinabalu and Langkawi.

Let us take Penang as an example. There is a substantial amount of freshwater being discharged into the sea during the wet seasons, yet it continues to obtain water from Perak. Wouldn't a nearshore reservoir be a better option?

Conclusion

Dam construction is counterproductive to government efforts and commitments to reduce our carbon footprint. Many countries have also expressed concerns over the loss of huge tracts of land that will be submerged by the dam reservoirs, as well as the constraints in developing the dam catchment post-construction.

On the other hand, a coastal reservoir can potentially resolve the water shortage problem during periods of drought by storing excess water during wet seasons. At the same time, the system can be designed to integrate flood mitigation and floating solar energy components as a sustainable estuary and coastal solution.

Malaysia is blessed with an abundance of rainfall. What we need to do is to store the water during the wet seasons for use during the dry seasons. While the option of a traditional upstream dam is less preferred nowadays due to limited suitable dam sites and the social and environmental impacts, downstream, nearshore and coastal reservoirs are suitable options to explore. ■

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Ir. Lim Sin Poh

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One-Day Workshop on Outcome Based Professional Interview

Date : 9 March 2024 (Saturday)
Time : 9.00 a.m. - 5.00 p.m.
Venue : Digital Platform & Wisma IEM
Speakers : Ir. Hj. Shamil Abu Hassan
: Ir. Gunasagaran Kristnan
: Ir. Lee Cheng Pay

Securing the Future: The Role of AI in Cybersecurity

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Venue : Wisma IEM
Approved CPD : 2
Speaker : Ir. Tejinder Singh

ICTSIG 26th AGM

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Venue : Wisma IEM
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Virtual Half-Day Course on Entrepreneurship for Engineering Students or Engineers Focused on Promoting Sustainability in Decent Work and Economic Growth

Date : 9 March 2024 (Saturday)
Time : 9.00 a.m. - 1.00 p.m.
Venue : Digital Platform
Approved CPD : 4
Speaker : Ir. Ts. Sukhairul Nizam Abdul Razak

Navigating the Electricity Supply Act 1990: Licensing Requirements for Technical Persons and Supporting Renewable Energy Initiatives

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Driving the Energy Transition: TNB Distribution Network Powering the Growth of Electric Vehicle Charging Infrastructure

In 2022, the global market for electric cars witnessed a remarkable expansion with sales surpassing 10 million units. This surge was reflected in the market share of electric cars among all new vehicle sales, which increased to 14%.

In Malaysia, the electric vehicle (EV) market also witnessed significant growth and this positive trajectory is anticipated to continue. In efforts to further enhance the development of EVs in the country, the National Energy Transition Roadmap (NETR) was launched in August 2023 and it identified Green Mobility as one of the six energy transition levers which will support our ambition to achieve Net Zero emissions by 2050. Under the Future Mobility flagship of the Green Mobility lever, a catalytic project has been planned to further expand the growth of EV charging stations. Led by MITI in partnership with government-linked companies (GLCs) and private sector entities, the goal is to install 10,000 EV charging stations across the country by 2025.

To ensure that the charging system is standardised and safe throughout the country, the Energy Commission (ST) has mandated that all Charge Point Operators (CPO) must obtain an EV Charging Station (EVCS) licence. This requirement is in line with the provisions of Section 9(1)(b) of the Electricity Supply Act 1990 (Amendment 2015) [Act A1501], which states that licences shall be issued to CPOs conducting electricity supply activities for commercial purposes for 10 years, depending on the installation location.

Tenaga Nasional Berhad (TNB) remains committed to realising the EV market potential, in line with targets set by the government. In the EV ecosystem, its main role is to ensure the network is ready to support the EV charging demand. The TNB Distribution Network (DN) is committed to providing a safe and secure network connection to enable EV developers or CPOs to install charging stations across the peninsula. DN is focusing on strengthening the grid infrastructure to support the development of EVCS. DN uses the five main documents listed below to provide a safe and secure network connection for EVCS:

i) Distribution Code for Peninsular Malaysia, Sabah & F.T. Labuan (Amendments) 2017 [1]
ii) Electricity Supply Application Handbook (ESAH) [2]
iii) Guide On Electric Vehicle Charging System (EVCS) [3]
iv) Garis Panduan Perancangan Petak Pengecasan Kenderaan Elektrik (EVCB) [4]
v) Technical Guidelines for Interconnection of Electric Vehicle to Distribution System [5]

The rapid integration of the EV charging infrastructure into the electrical network also introduces new challenges in the operation and planning of the power system network. If not properly planned and managed, effects such as a sudden increase in load, power quality and voltage stability issues or difficulty of optimisation of power network operation and control may arise. As such, adherence to technical guidelines is critical to ensure the distribution network is reliable and secure at all times.

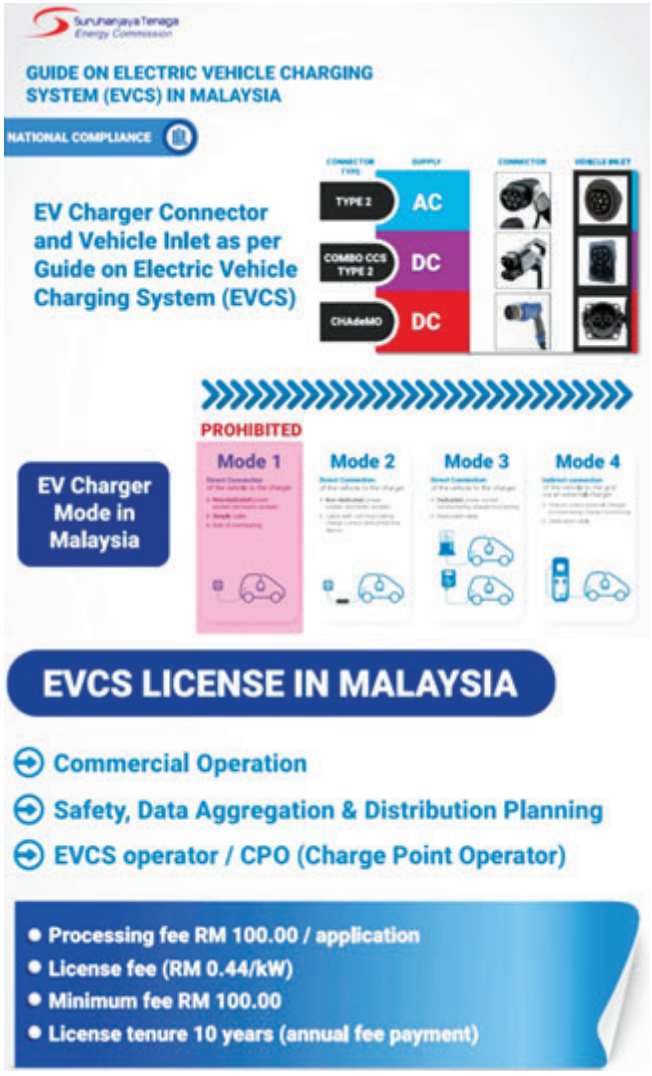

Figure 1: Requirement of EVCS Licence from Suruhanjaya Tenaga (EC) for public EV chargers in Malaysia (st.gov.my)

Figure 2: Main reference documents for strengthening grid infrastructure for development of EVCS

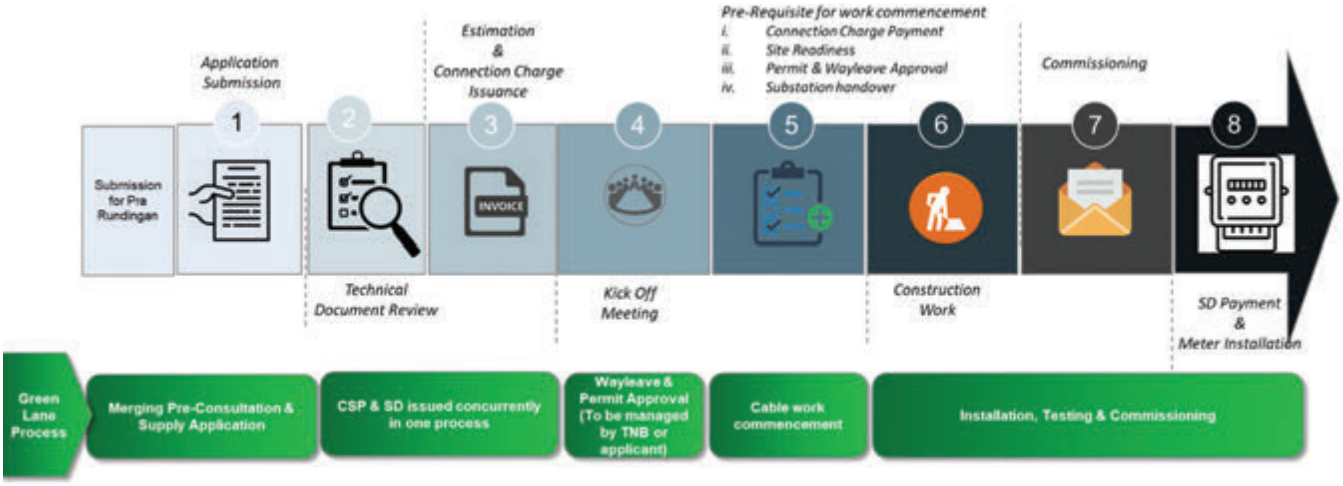

Figure 3: Process for Green Lane Supply application

Table 1: Types of Supply Application and criteria for EV Green Lane scheme

No.	Maximum Demand	Types of Supply Application	Criteria
1	61kW – 240kW	400V and below (without substation) *follow process as 241kW-850kW if substation is required	• Supply from existing PE (Subjected to system capability) • Maximum distance of 200m • Cable route not crossing third party's private property, railway & LLM
2	241kW – 850kW	400V and below (with substation) * follow process as 61-240kW if substation is not required	• New substation is required • Maximum distance of MV cable – 1km • Cable route not crossing third party's private property, railway & LLM

In 2023, the TNB DN introduced the Green Lane Supply Connection for EV Charging Stations with the goal to increase efficiency of giving supply procedures in order to facilitate the growing demand of the EV industry. In this new process, it aims to reduce interactions between Charge Point Operator (CPO) and EVCS Licensee (applicant) with TNB during the supply connection process and ultimately enabling a faster supply connection. There are two categories of supply applications qualified under this Green Lane scheme as shown in Table 1.

As of 31 December 2023, the TNB DN had checked 126 locations for supply to electric vehicle charging stations and provided electricity to 36 locations with a maximum demand load of 6.97 MW. 2024 marks a new beginning for DN in powering the growth of EV and further supporting the decarbonisation effort within TNB. DN has taken important steps to electrify a significant portion of its fleet. Its new EV fleet, comprising 98 new units of pickup trucks and EV vans, has started operations and replaced the traditional diesel-powered vehicles; this will introduce a significant shift towards a greener and more sustainable environment. ■

For more info on the TNB Smart Grid, go to:
https://www.tnb.com.my/smart-grid/;

to explore electricity application, you can go to applications at:
https://www.mytnb.com.my/

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- Ir. Ainon Shakila Shamsuddin
- Ir. Arulchothy Arulambalam
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River Health Index Feasibility Study for River Basins in Malaysia

Water Resources Technical Division

The Department of Irrigation & Drainage (DID) Malaysia is considering the use of more holistic parameters in developing the River Health Index (RHI) scale as a tool to assess water quality variables parameters and to produce RHI reference guidelines for water resource managers. This study involves 3 states: Perak, Penang and Kedah for this RHI early development. RHI has been used internationally. RHI applications in China and Thailand are referred to in this study in developing the RHI.

In the study, 2 main rivers in the northern part of the peninsula have been selected due to their function and demand: Sungai Muda in Kedah and Penang and Sungai Kurau in Perak. Sungai Kurau is the primary source of water for agriculture irrigation and human consumption while Sungai Muda is estimated to provide almost 40% of the water demand in Kedah and, being the largest river in Kedah, that is important for food security.

Primary data was collected through sampling and site data collection. Secondary data was obtained through related technical agencies such as the DID, the Department of Environment and the Department of Town & Country Planning (PLANMalaysia). Data of both rivers was collected from the upstream to the downstream. Secondary data such as rainfall, water level, streamflow and water quality station were analysed for trend determination, understanding and verification for the development of the RHI. Several sampling points for both Sungai Kurau and Sungai Muda were also selected, either at the upstream, midstream or downstream and studied with regards to the land characteristics of the selected site.

The stakeholder engagement was also carried out for better feedback from consumers in Sungai Kurau and Sungai Muda, with the aim to build relationships with stakeholders, understand their perspectives and address their concerns. Stakeholder preferences are a vital component of the river health assessment. Through focused group discussions, stakeholders expressed their values and priorities, with regards to the condition of the river.

The RHI study is intended to be a comprehensive assessment tool for evaluating the overall health of a river system by considering four main categories of characteristics: Chemical, Physical, Biological and Sociological. Sub-indexes and attributes are determined using the Multi-Criteria Decision Analysis method, specifically the Analytical Hierarchy Process which allows for systematically comparing attributes within each sub-index and assigning relative importance to these attributes. Attributes selected are given a score of 1 to 4 for evaluation. The scoring is developed based on the maximum and minimum quality/quantity that each attribute can achieve. The index provides a single value representing the holistic health of the river system and the highest score a river can obtain is 100%. It incorporates the preferences of stakeholders and allows for easy comparison and monitoring of river health over time.

The formula used to calculate the RHI is:

$$RHI\ (\%) = W_C\ (A_{C1\text{-}4}) + W_P\ (A_{P1\text{-}7}) + W_B\ (A_{B1,2}) + W_S\ (A_{S1,2})$$

Where
WC = Weightage of Chemical sub-index, 30%
WP = Weightage of Physical sub-index, 27%
WB =Weightage of Biological sub-index, 25%
WS =Weightage of Sociological sub-index, 18%
AC =Normalised score of Chemical attributes
AP = Normalised score of Physical attributes
AB = Normalised score of Biological attributes
AS = Normalised score of Sociological attributes

Replacing the final weightage of sub-index into the equation:

$$RHI\ (\%) = 30\ (A_{C1\text{-}4}) + 27\ (A_{P1\text{-}7}) + 25\ (A_{B1,2}) + 18\ (A_{S1,2})$$

Based on the final RHI value, river health can be classified into four groups as shown in Table 1.

Table 1: Classification of RHI

RHI (%)	Category	Description
75 - 100	A	Very healthy
50 – 74	B	Moderately healthy
25 – 49	C	Poor
0-24	D	Very poor

In conclusion, implementation of the RHI will serve as an essential tool to assess, manage and safeguard the water quality of the rivers, supporting sustainable agricultural practices, preserving biodiversity and ensuring the availability of clean water for our future generations. ■

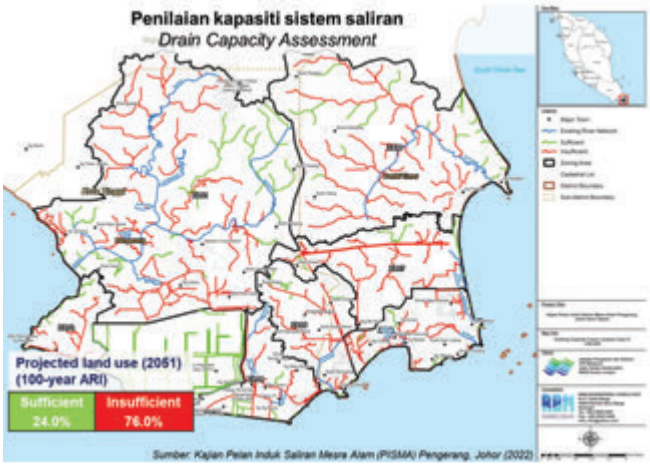
Prepared by:

Sazliana Abu Omar

Stormwater Management & Drainage Master Plan

Water Resources Technical Division

Flash floods happen all over Malaysia, especially in city centres. Flash floods are caused by many factors. Very high intensity short duration rainfall seems to be the main cause. Then there is rapid and high-density urban development without upgrading the existing drainage system which, if old, improper and under-capacity, will contribute to flash floods. In some cases, the existing drainage system has not been well maintained or improved due to budget constraint; this will also cause the backflow of water from downstream.



Drain capacity assessment

The Street, Drainage & Building Act 1974 (Act 133) clearly stated that the Local Authority (Pihak Berkuasa Tempatan or PBT) should be responsible for the construction and maintainance of drains and watercourses and the Memorandum of the Cabinet Meeting dated 19 June 1996, decided that Department of Drainage & Irrigation, Malaysia (DID) should be given full responsibility for managing and maintaining all rivers, including those in PBT areas. With records of flash flood events adding up to more than 300 times each year, it is necessary to overcome this issue holistically. So the DID has come up with the Stormwater Management & Drainage Master Plan (Pelan Induk Saliran Mesra Alam or PISMA).

The main output of PISMA includes:

(a) Study area information
(b) Proposed future development (Kawasan cadangan pembangunan)
(c) Flood hazard map
(d) Drainage capacity assessment
(e) Stormwater quantity master plan
(f) Stormwater quality master plan
(g) Stormwater Asset Inventory System (SAIS)
(h) Proposed minimum habitable flood levels of the buildings.

The management of the drainage system in our country is jointly carried out by various parties such as PBT, DID, developers and related agencies; PISMA is applied where city level agencies focus on localised urban issues with a long-term solution. PISMA is basically a master plan that complies with the Manual Saliran Mesra Alam (MSMA) and it tries to identify issues and weaknesses related to existing drainage and stormwater systems and water quality. Proposed works to be implemented are based on long-term solutions to overcome flash floods and water quality issues in urban areas. As a result, it will act as a guide and reference for more systematic development in future. ■

Prepared by:

Ms. Carine Wong Koh Yin

DEEPEST CONDOLENCES

On behalf of
The Institution of Engineers, Malaysia (IEM),
we would like to express our deepest condolence to the bereaved family of
Allahyarham Dato' Ir. Hj. Zainurin Hj. Karman (M 14174).

We at IEM, honour his contribution to IEM as the Past IEM Negeri Sembilan Branch Chairman and Council Member Session 2016 – 2018.

IMPORTANT NOTICE REGARDING SST RATE ADJUSTMENT

IEM wish to inform of the upcoming change in the Sales & Service Tax (SST) rate as per the recent announcement by the Malaysian authorities. Please settle any outstanding order/ invoices by 11:00 p.m. (Malaysian time) on February 28, 2024, to maintain the current 6% SST Rate. Starting March 1, 2024, all outstanding invoices will be subject to the latest 8% SST rate. Should you require any further clarification or assistance, please do not hesitate to reach out to us at: *finance@iem.org.my.*

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Connecting Minds for Sustainable Climate Future

Engineering Education Technical Division

In a world facing the pressing realities of climate change, the imperative for collective action and innovative solutions has never been more pronounced. Recognising the pivotal role that engineers play in addressing this global challenge, the Engineering Education Technical Division (E2TD) of the Institution of Engineers, Malaysia (IEM) collaborated with the School of Engineering, University of Wollongong Malaysia, to present an enlightening exhibition on global climate change.

The Global Climate Change Week (GCCW) 2023 ran on 16-20 October 2023. It brought together various environmental organisations such as SW Corp, EcoGarage, Greenpeace, Kloth, Indah Water Konsortium, WWF, ESG Energy Sdn. Bhd., FatHopes Energy Sdn. Bhd. Magic Seed, Nestle Malaysia, Yakult Malaysia, Magic Seed, Farm Fresh and external vendors for food and beverages.

The event offered a platform for knowledge exchange, collaboration and inspiration. With the active participation of the environmental organisations, insightful forum discussions and engaging activities, it successfully promoted the importance of local initiatives in building climate resilience. The diverse range of participants and activities underscored the collective effort required to combat climate change.

GCCW started with a welcome speech and launching gimmick by Prof. Hiew Pang Leang, Vice Chancellor of UOW Malaysia. This was followed by a message from Assoc. Prof. Dr Belinda Gibbons from GCCW, UOW Australia. The first activity of the day was a forum session titled Empowering Communities: Local Initiatives for Climate Resilience. The session was moderated by Ts. Dr Nishata Royan and the panelists came from various backgrounds. They were environmental activist Datin Sivamani Rasiah, former President of the Bukit Jelutong Resident Association, Ms. Sharmaine XinHui Kaur, founder of EcoGarage and Prof. Timothy McCarthy, Director of Sustainable Buildings Research Centre, UOW Australia. Discussions centred on local initiatives for climate resilience and ways to empower communities to take action to combat climate change.

There was an exhibition featuring interactive displays, demonstrations, workshop, art exhibitions and competitions such as a Tik-Tok Challenge and making sculptures from recycled materials which was judged by Mr. Muhammad Haziq Muhammad Basri from WWF, Ir. Ts. Dr Baljit Singh from E2TD and Ts. Dr Siti Birkha Mohd Ali from IET.

There were two workshops. One featured a showcase on food composting and the other was on making a terrarium by the Engineering Society and IEM Student Chapter. There were also demonstrations by Mrs. Norazlina Ismail of SW Corp on how to recycle jeans and by Mr. Dhiren Kaylen Ram of IEM student chapter on the food composting machine. Apart from these, there were also STEM activities for secondary school students conducted by SOE, SCCM and Pre-U. The students came from SMK Desa Perdana and SMK Kota Kemuning.

The event concluded at 4.00 p.m., leaving participants motivated and equipped with valuable insights and solutions to contribute towards a sustainable future. ■

Opening speeches and gimmick launching by Prof. Hiew Pang Leang

Forum session moderated by Ts. Dr Nishata Royan with (from left to right) Datin Sivamani, Ms. Sharmaine and Prof. Timothy (live from UOW Australia)]

Group photo with winners, exhibitors and organisers

Prepared by:

Ts. Nur Hasalli Ibrahim

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Women Engineers at CAFEO 41

Women Engineers Section

Last year, the annual Conference of the ASEAN Federation of Engineering Organisations (CAFEO) was held in Bali, Indonesia, on 21-23 November 2023, with the theme, Igniting ASEAN's Blue Economy & Green Energy.

Concurrently, the Women Engineers of ASEAN Federation of Engineering Organisations (WE-AFEO) conducted the annual governing board and country report meeting at the Bali International Convention Centre (BICC), in addition to the 7th Women Engineers Summit. The WE-AFEO programmes were hosted by women engineers from Forum Perempuan Insinyur-Persatuan Insinyur Indonesia (FPI-PII) and led by WE-AFEO chairwoman Ir. Sri Hidayati. Also planned were pre- and post-event activities so that the women engineers could enjoy and experience the natural beauty of Bali, also known as Land of the Gods.

Pre-conference activities began with a yoga session at sunrise at Pura Nusa Dharma Nusa Dua Island, followed by a morning stroll along the luxurious sandy beach of Nusa Dua. This small island is famous for its yoga space, running track and leisure walks as well as its beautiful nature and calm atmosphere. A turtle conservation session was included as part of the Beach & Fun Walk by FPI-PII, where 10 baby turtles were released into the sea as part of our commitment aligned with the United Nations' Sustainable Development Goal 14 (SDG) to keep the oceans clean and safe for turtles.

CAFEO 41 also showcased an exhibition where various Indonesian engineering players such as Konstruksi Jaya, Pertamina and Perusahaan Listrik Negara took part. There, conference participants learnt about state-of-the-art technologies available in today's market which supported the blue economy and green energy initiatives. Women engineers from the ASEAN countries assembled and used this platform to share success stories and challenges as well as planned collaborations for 2024.

The day continued with FPI-PII hosting a scrumptious sunset dinner on Jimbaran beach, together with a beautiful Balinese dance and WE-AFEO women ended the day with a karaoke session.

The 7th Women Engineers Summit was sponsored by Tripatra (member of Indika Energy Group), with the theme, Women Engineers Leadership: Let's Face the Challenges. This year, the summit was divided into two sessions, paper presentations and talk show-style sessions. The chairwoman of WE-AFEO's host country, Ir. Sri Hidayati, officiated at the opening and inauguration of the summit which were emceed by Ir. Dr Setyawaty Yani from Indonesia.

The paper presentation session was moderated by Ir. Dr Simayanti from Indonesia and the panel members were:

1. Ir. Dr Erna Yuliwati and Prof. Dr Corina D. Riantoputra (Indonesia) on Women Engineers Psychology
2. Ir. Ts. Noorfaizah Hamzah (Malaysia) on Inspiring Women Engineers
3. Ir. Tran Thi Phuong Tram (Vietnam) on Women Engineers Roles in the Development of Power Industry
4. Engr. Nandry Clae B. Lagman (Philippines) on Women Engineers Challenges in the Mining & Minerals Industry.

The talk show session, Leadership & Strength of Women Engineers, was moderated by Ms. Jasmine Foo from Singapore and the panel members were:

1. Ms. Fauziah Yasmine Yuzi (Indonesia)
2. Ir. Dr Jeyanthi Ramasamy (Malaysia)
3. Ir. Lim Sui Kau Alice (Brunei)
4. Ms. Poontrika Walton (Thailand).

The summit concluded with a souvenir exchange ceremony and the handing over of the WE-AFEO flag to Ir. Assoc. Prof. Eur. Ing. Dr Syuhaida Ismail as the host of the 8th Women Engineers Summit 2024 in Malaysia. Before closing the year's event, we went on a technical and cultural visit to Penglipuran Village, a traditional Balinese village where bamboo is used as the medium to build houses and to the Tegalalang rice terraces in Ubud for Instagrammable photographs of its stunning views.

The turtle conservation activity led by WE-AFEO

The leaders of women engineers of ASEAN countries

All members of WE-AFEO were delighted with the packed programmes arranged and the hospitality of the FPI-PII chairwoman and the respective committee members. See you all next year at CAFEO 42 in Kota Kinabalu, Sabah! ■

Prepared by:

Ir. Ts. Nur Azhani Mohamad Rosli

NOTICE OF IEM (PENANG BRANCH) OFFICE BEARERS 2024/2025

The Institution of Engineers, Malaysia (IEM) Penang Branch had its 57th Annual General Meeting on 24 Feb 2024 and we are pleased to introduce the new IEM Penang Branch Office Bearers for session 2024/2025:

IEM Penang Branch Executive Committee 2024/2025	
Chairman	Ir. Chan Wah Cheong, PJM
Vice Chairman	Ir. Dr Chang Chun Kiat Ir. Dr Lee Choo Yong, PKT
Honorary Secretary	Ir. Choo Lay Guat, Juliet
Honorary Treasurer	Ir. Lian Shin Wai, Andy
Immediate Past Chairman	Ir. Dr Bernard Lim Kee Weng, DJN, PJM
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IEM YES Networking Delight: Tea-Time with Professional Engineers

Young Engineers Section

The IEM YES Networking Delight: Tea-time with Engineers event, held on 30 September 2023, was organised by IEM Young Engineers Section (IEM YES). It brought together IEM students and graduate members for a unique opportunity to network with engineers from various sectors of the industry, including representatives from The Institution of Engineers, Malaysia (IEM), The Board of Engineers Malaysia (BEM), The Association of Consulting Engineers Malaysia (ACEM) and The Malaysian Society for Engineering & Technology (MySET). In total, 13 professional engineers and 31 students and graduate members came together to make the event a memorable one.

Group photo

After the opening speech by YES Chairman, Mr. Muhammad Ashiq Marecan Hamid Marecan, who set the tone for a fruitful networking experience, there was a brief introduction of each invited guest which allowed participants to become acquainted with the professionals in attendance.

The core of the event was the networking session, which took place over a delectable spread of food and tea. Participants were divided into groups based on their respective engineering disciplines, facilitating meaningful interactions with distinguished guests. The fields of engineering discussed included construction, consultancy, oil & gas industry, aviation, mechanical and electrical services as well as academia.

This ensured that every attendee had the opportunity to connect, share experiences, and gain valuable insights and guidance from peers and industry experts. The prominent engineers came from consultancy, academia, government services, industry and NGO organisations.

The highlight of the event was the forum sharing session titled Career Path as An Engineer, featuring panellists Ir. Dr Megat Zuhairy Megat Tajuddin (BEM Registrar), Ir. Ts. Dr Bernard Lim Kee Weng (Immediate Past Chairman of IEM Penang Branch), Ir. Ricky Liew Chee Leong (Vice President of MySET) and Ir. Chong Chew Fan (President of ACEM).

Forum sharing session with the panelist and moderators

Tea-time networking session

Facilitated by our IEM YES Vice Chairman I, Mr. Lim Yiren, and IEM YES Honorary Secretary & Treasurer, Mr. Chuah Pei Lim, the panellists engaged in open and insightful discussions, sharing their knowledge, experiences and perspectives on career development within the engineering field. This offered attendees valuable insights into prevailing industry trends, challenges and opportunities, further enriching their understanding of their chosen profession.

Overall, the IEM YES Networking Delight: Tea-time with Engineers effectively fostered networking, knowledge sharing and career insights among the participants. It not only strengthened the bonds within the engineering community, but also provided a platform for students and graduate members to connect with industry leaders and experts.

We, the organising committee from IEM YES, would like to express gratitude to all our guests and participants who helped make the event a success. We look forward to organising more events in future to promote the development of young engineers. ■

Prepared by:

Ong Ye Shian

Jingle & Mingle: Young Professionals Christmas Networking 2023

Young Engineers Section

The air was filled with festive cheer and professional camaraderie as the IEM Young Engineers Section (IEM YES), Kuala Lumpur Bar Council Young Lawyers Committee (KLBC YLC) and Malaysian Pharmacists Society Young Pharmacists Chapter (MPS YPC) came together on 16 December 2023 for Jingle & Mingle: Young Professionals Christmas Networking 2023.

The event achieved its objectives to provide a platform for participants from various professions to connect, to build meaningful relationships and to foster collaboration among their peers in a relaxed, joyful atmosphere. There were 35 participants from different professions.

The event commenced with a brief introduction by Mr. Lim Yiren, the Vice Chairman of IEM YES, who extended a warm welcome to all participants. Then came the icebreaking session which set the stage for a relaxed and cheerful atmosphere. Laughter echoed all around as barriers dissolved, paving the way for meaningful and joyful interactions.

As an integral part of any gathering, the potluck spread added a flavourful touch to the event while participants were seen sharing stories that transcended the boundaries of their respective fields. Pharmacists shared with us the latest trends in the medical industry and the numerous job opportunities available. Lawyers talked about volunteerism within organisations, providing meaningful motivation to the youth volunteers and engineers discussed the diverse fields of engineering services and the perseverance required to overcome challenges in both life and work.

Another memorable moment of the evening was the gift exchange session, a simple yet meaningful gesture that underscored the spirit of joy and unity. As gifts were exchanged, connections and bonds were forged and solidified, creating a shared sense of celebration. Memories were crafted during the networking event, providing a meaningful experience for all participants that will resonate with them long into the future.

Overall, the Jingle & Mingle: Young Professionals Christmas Networking 2023 was a huge success, effectively fostering networking, unity and professional synergy among young professionals.

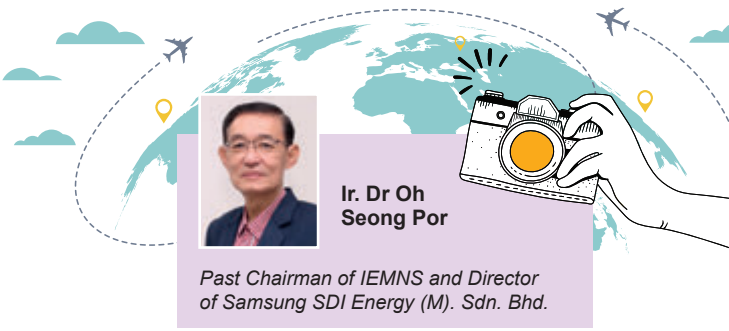
We, the organising committee from IEM YES, would like to express our gratitude to the Young Professionals Alliance and all our participants who made this event a success. We look forward to organising more events for young professionals in the future. ■

Prepared by:

Ong Ye Shian

Group photo

Forgotten Footbridge of BM Railway Station



Ir. Dr Oh Seong Por

Past Chairman of IEMNS and Director of Samsung SDI Energy (M). Sdn. Bhd.

On the way to back to my hometown, Penang, I dropped by Taiping and to my surprise, I stumbled upon bits and pieces of Bukit Mertajam's heritage in Taiping old town. These included an old footbridge originally built at Bukit Mertajam Railway Station in the early 1900s. I recognised the bridge immediately because I saw it often during my school days at Bukit Mertajam High School which was located near the station.

So I did some investigating. The old railway station was decommissioned in 2013 after a new one was built in order to cater for the double track and electric train. The footbridge was dismantled and if not for First Galleria, a private museum in Taiping which acquired it, it would probably have ended up as scrap metal.

The footbridge was reassembled in Taiping at its present location. Its design is Victorian style, with a cast iron structure and timber flooring made from cengal wood. It has decorative pillars and a segmental arch roof at the top deck as well as stairways. I examined the timber and found it to be in good condition. Even some fasteners such as rivets, bolts and screws are the original ones. The bridge looks solid and overall, is well preserved.

It has been reported that there is another bridge of similar design in the United Kingdom. Named Bridge of Dun Station near Montrose, Scotland, it is still functioning. ■

Picture of the footbridge at its original location in BM Railway Station taken in the 1900s

Details of the footbridge

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My Enchanting Engineering Exploration Journey in Mauritius

Ir. Prof. Dr Leong Wai Yie

Mauritius is a jewel in the Indian Ocean. Blessed with pristine beaches, lush greenery and a vibrant culture, the island nation beckoned me with promises of unforgettable experiences. In the winter of 2023, I embarked on a journey to Mauritius to visit the School of Engineering of the University of Mauritius, the University of Technology Mauritius, Universite des Mascareignes and the Open University of Mauritius.

What followed was a captivating adventure that left an indelible mark on my heart. I had the privilege to visit staff members from the School of Engineering and conducted public talks on Research Innovation, Engineering Accreditation and Sharing of Malaysia Culture at the four universities.

The Mauritius trip would not have materialised without the special arrangements made by the Past President of The Institution of Engineers (IEM), Mauritius, Mr. Roy Shyam. IEM Mauritius is an institution involved at the national level, with representatives on the boards of various institutions such as the Central Electricity Board, the Mauritius Standard Bureau, the University of Mauritius, the Council of Registered Professional Engineers (C.R.P.E) of Mauritius, The Mauritius Standards Bureau (MSB) Council and sub committees, The Construction Industry Development Board (CIDB) and other councils. I visited the current President, Mr. Raj H. Prayag, and other top office bearers. We had an exchange of souvenirs, journal publications and held discussions on cross-border collaboration.

The faculty staff members took me to Port Louis, the vibrant capital of Mauritius which is a melting pot of cultures. I wasted no time immersing myself in its rich history and traditions. The bustling Central Market was a sensory delight, with colourful stalls offering spices, fresh produce and handmade crafts. As I wandered through the streets, the scent of street food wafted through the air, tempting me to try local delicacies like dholl puri and samosas.

Mauritius is renowned for its stunning beaches and I couldn't wait to sink my toes into the soft, powdery sands and dive into the crystal-clear waters. I spent blissful days on beaches like Trou aux Biches, Flic en Flac and Belle Mare. A highlight of my beach exploration was a visit to Île aux Cerfs, a picturesque island off the east coast of Mauritius.

But Mauritius is not just about beaches; it's also a treasure trove of natural beauty and its cultural diversity is one of its defining features. I had the privilege to experience it firsthand. The population comprises various ethnic groups such as Indo-Mauritians, Creoles, Chinese and French descendants. This cultural mosaic is reflected in the cuisine, festivals and traditions of Mauritius.

The IEM President, Mr. Raj H, Prayag, and the top office bearers presenting IEM (Mauritius) journals

With the Past President of The Institution of Engineers, Mauritius, Mr. Roy Shyam (right)

Fruitful discussion at the University of Technology Mauritius

My visit to Mauritius was a journey of engineering research collaboration and exploration. The natural beauty and rich culture of the island as well as the warm hospitality of its people left a deep impression on me. From the stunning beaches to the vibrant streets of Port Louis and the serene beauty of its national parks, Mauritius offers something for every traveller. ■

Temuduga Profesional

Tarikh: 22 Februari 2024

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2024

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2024.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2024.

Sekiranya terdapat Ahli Korporat yang mempunyai bantahan terhadap mana-mana calon yang didapati tidak sesuai untuk menduduki Temuduga Profesional, surat bantahan boleh dikemukakan kepada Setiausaha Kehormat, IEM. Surat bantahan hendaklah dikemukakan sebulan dari tarikh penerbitan dikeluarkan.

Ir. Prof. Dr Zuhaina Zakaria
Setiausaha Kehormat, IEM

PERMOHONAN BARU

Nama	Kelayakan
KEJURUTERAAN AWAM	
MOHD RAIMI BIN MOHD RAZUKI	BE HONS (UTM) (CIVIL, 2010) MSc (UTM) (CIVIL (STRUCTURES), 2012)
KEJURUTERAAN ELEKTRIKAL	
MOHD ISRAN BIN CHE MUSTAPHA	ADV.DIP. (UiTM) (ELECTRICAL, 1994) ME (UiTM) (ENGINEERING MANAGEMENT, 2014)
MUHAMMAD ADAM BIN SAMSUDIN	BE HONS (UNITEN) (ELECTRICAL POWER, 2016)
MUHAMMAD SAIFUL AZAMI BIN MAKHTAR	BE HONS (UNITEN) (ELECTRICAL, 2017)
KEJURUTERAAN ELEKTRONIK	
RUDIE ARMAN BIN MALIE	BE (UKM) (ELECTRICAL, ELECTRONIC AND SYSTEM, 1995)
KEJURUTERAAN MEKANIKAL	
MD EZAIME ARIF BIN MD EUSOFE	BE (UM) (MECHANICAL, 2010)

PERMOHONAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
SUNTHAR A/L ARUMOGAM	BE (UTM) (CIVIL, 2010) ME (UTM) (CIVIL-GEOTECHNICS, 2011)
MUHAMMAD MIRIZWAN BIN ABDUL MANAN	BSc (ARIZONA STATE) (CIVIL, 2000) MSc (UPM) (HIGHWAY AND TRANSPORT, 2006) PhD (LUNDS) (2014)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
90119	CHEAH ZU YI	BE HONS (USM) (CIVIL, 2018)
29015	CHEONG LAI THENG	BE (UTM) (CIVIL, 2005)
88561	KONG CHUN ZHUN	BE HONS (UCTS) (CIVIL, 2016)
51877	LAU TUNG WONG	BE HONS (UNIMAS) (CIVIL, 2013) ME (UNIMAS) (CIVIL, 2016)
74494	MUHAMAD FIQRY BIN SELAMAT	BE HONS (UTM) (CIVIL, 2016)
108025	TING ZHI HONG, TIMOTHY	BE HONS (CURTIN) (CIVIL AND CONSTRUCTION, 2016) PhD (CURTIN) (2019)
KEJURUTERAAN ELEKTRIKAL		
37958	NASRUL HADI BIN MAHMAD	BE HONS (UNITEN) (ELECTRICAL AND ELECTRONIC, 2001)
KEJURUTERAAN PEMBUATAN		
37459	NISHATA ROYAN A/P RAJENDRAN ROYAN	BE (UKM) (MANUFACTURING, 2009) MSc (UKM) (MECHANICAL & MATERIALS, 2012) PhD (UKM) (2018)
112485	PHUAH YONG ZHEN	BE HONS (UniMAP) (MANUFACTURING, 2016)
KEJURUTERAAN MEKANIKAL		
88809	ALDDYRINE GUNGAT	BE HONS (UTP) (MECHANICAL, 2010)

PERPINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
117132	AIDEELNORFAHMEE BIN MOHAMAD	BE HONS (UMP) (CIVIL, 2015)
81367	GOH QIU YOU	BE HONS (IUKL) (CIVIL, 2017)
99187	LAI CHIONG SUN, ROBIN	ME HONS (NOTTINGHAM) (CIVIL, 2018)
22101	NOOR FAZLIN BINTI RAMLI	BE HONS (UTM) (CIVIL, 2000)
KEJURUTERAAN MEKANIKAL		
105660	LEE WONG THENG	BE HONS (UTAR) (MECHANICAL, 2011)

Pengumuman yang ke-184

SENARAI PENDERMA KEPADA WISMA DANA BANGUNAN IEM

Institusi mengucapkan terima kasih kepada semua yang telah memberikan sumbangan kepada tabung Bangunan Wisma IEM. Ahli-ahli IEM dan pembaca yang ingin memberikan sumbangan boleh berbuat demikian dengan memuat turun borang di laman web IEM *http://myiem.org.my* atau menghubungi secretariat di +603-7890 0130 / 136 untuk maklumat lanjut. Senarai penyumbang untuk bulan Januari 2024 adalah seperti jadual di bawah:

No.	No. Ahli	Nama
1	119674	Ir. Izham bin Ashab @ Izhab
2	15346	Ir. Ramaya A/L Raman
3	87317	Mr. Choo Cheng Wai
4	64855	Ir. Shaharin bin Hamid
5	9666	Ir. Lim Tock King
6	15357	Ir. Hoo Chee Sian
7	-	Ali @ Taib Abu Bakar
8	71674	Ms. Noriah binti Yusoff
9	45867	Ir. Lee Fei Han @ Lee Kot Chuen, Lenior
10	12842	Ir. Amat Yazid bin Othman
11	24383	Ir. Pang Wei Chin
12	24833	Ir. Wan Azhar bin Sulaiman
13	41027	Ms. Siti Rafidah binti Moslim
14	111794	Mr. Lau Swee Leong
15	17616	Ir. Mohd. Azlani bin Sehap
16	14580	Ir. Sia Tung Kiong
17	15356	Ir. Chow Chee Heng
18	12820	Ir. Che Ujang bin Ibrahim
19	24312	Ir. Mohd Faris bin Ariffin
20	47086	Mr. Unazie Iskandar bin Abd Razak
21	25636	Ir. Chong Seng Gou, Wesley
22	25252	Mr. Foo Yew Chin
23	40010	Mr. Terrence Selvin A/L Abraham Pattu
24	9646	Ir. Chai Siew Key
25	20097	Mr. Mohd Fauzi bin Shafie
26	09830	Ir. Wan Manan bin Wan Ali
27	18015	Mr. Mohd. Tajudin bin Rejab
28	21223	Ms. Soo Wai Yee
29	26524	Mr. Mohd Mujib bin Md. Derus
30	12051	Ir. Wong Mok Far
31	30253	Mr. Anuar bin Adnan
32	24851	Mr. Koh Peng Chun
33	14639	Ir. Saiful Bahri bin Sharif
34	54115	Mr. Razali bin Daman

GUIDELINE FOR PI UNDER MATERIAL ENGINEERING DISCIPLINE
Material Engineering Technical Division (MaTD)

The guideline was endorsed by Council on 16th January 2023.

Material Engineering plays a critical role in shaping the world we live in. Material Engineers are responsible for development, characterization and overall performance of the materials. Given the importance of their work, it is essential that engineers adhere to a set of professional code of conducts to ensure the safety and well being of the public and environment. The engineering fraternity in Malaysia has a long history of establishing and enforcing ethical standards and professional guidelines. The Material Engineering Technical Division (MaTD) has developed an IEM Professional Interview Guideline for Materials Engineers seeking to obtain their Professional Engineering status. These guidelines which is inline with the existing IEM Competency Standard for Professional Interview will provide a framework of integrity, professionalism and accountability for future engineers. The guideline will focus on the general and specialist engineering knowledge and ability for engineers to apply the theoretical knowledge for engineering solutions in Material engineering. The guideline can be request via email to Secretariat at:

pi-submission@iem.org.my.

PERMOHONAN BARU / PEMINDAHAN AHLI

Persidangan Majlis IEM yang ke-**435** pada **20 Mac 2023** telah meluluskan sebanyak **551** ahli untuk permohonan baru dan permindahan ahli. Berikut adalah senarai ahli mengikut disiplin kejuruteraan:

DISIPLIN	GRED KEAHLIAN											
	FELO	SENIOR	AHLI	SENIOR GRADUATE	SISWAZAH	"ENGINEERING TECHNOLOGIST GRADUATE MEMBER"	"ENGINEERING TECHNICIAN GRADUATE MEMBER"	"INCORPORATED"	"AFFILIATE"	"ASSOCIATE"	SISWA	JUMLAH
Aeronautikal					1						1	2
Aeroangkasa					2							2
Pertanian					1							1
Automotif											1	1
Biokimia											1	1
Bioperubatan					3						13	16
Kimia	1		6		12	1					24	44
Awam			35		70			1			73	179
Komunikasi					1							1
Komputer			1								1	1
Elektrikal & Elektronik											21	21
Elektrikal			18	1	31	2					35	87
Elektronik			2	1	9					1	25	38
Alam Sekitar					1						2	3
Geoteknik			4									4
Maklumat Teknologi											1	1
Pembuatan					1							1
Sistem Pembuatan					1							1
Bahan					2						1	3
Metallurgi					1							1
Mekanikal		1	24	1	36	1		1			57	121
Mekatronik			1		1						12	14
Sumber Mineral				2								2
Petroleum					2						1	3
Nuklear					1						2	3
JUMLAH	**1**	**1**	**91**	**5**	**176**	**4**		**2**			**271**	**551**

Senarai nama ahli dan kelayakan adalah seperti di bawah. Institusi mengucapkan tahniah kepada ahli yang telah berjaya.

Ir. Prof. Dr Zuhaina Zakaria
Setiausaha Kehormat, Institusi Jurutera Malaysia, Sesi 2022/2023

PERMINDAHAN AHLI KEPADA AHLI FELLOW

No. Ahli	Nama	Kelayakan
KEJURUTERAAN KIMIA		
26348	Ir. DR CHONG CHIEN HWA	BE. HONS (UTM) (CHEMICAL) (2007) PhD (NOTTINGHAM) (2010)

PEMINDAHAN KEPADA AHLI 'SENIOR'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN MEKANIKAL		
29059	SOPHIAN BIN RAIS	BE HONS (UTM) (MECHANICAL, 1997)

PEMINDAHAN AHLI KEPADA AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
21189	CHAN YORK LIN	BE HONS (UTM) (CIVIL, 2003)
54085	CHEONG WAI KEONG	BE HONS (UNIMAS) (CIVIL, 2010)
97437	CHUA PENG YANG	BE (UMP) (CIVIL, 2013)
17326	DANEIL ANAK PUNANG	BE HONS (UTM) (CIVIL, 1989)
89475	HANG KAH JOON	BE HONS (KLiUC) (CIVIL, 2011)
86333	HENG ZEN HWA, RAYMOND	BE HONS (ADELAIDE) (CIVIL AND STRUCTURAL, 2012)
48071	JILL FLUER C BENSING	BE HONS (UTM) (CIVIL, 2006)
101993	LAU CZE HIENG, BRYAN	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2016)
20597	LEE CHUI HOON	BE HONS (UTM) (CIVIL, 2005)
23201	LIM CHEE SENG	BE HONS (NANYANG) (CIVIL, 1999) MSc (NANYANG) (INTERNATIONAL CONSTRUCTION MANAGEMENT, 2004)
37095	MOHD HAZRUL FAEZ BIN RAHIAM	BE HONS (UTHM) (CIVIL, 2011)
54418	MUHAMMAD QAYYUM BIN AMRAN	BE HONS (UiTM) (CIVIL (INFRASTRUCTURE), 2014)
71389	NOOR AMANINA BINTI MUSA	BE HONS (UTHM) (CIVIL, 2015)
72623	SWEE YENN PERNG	BE HONS (BRADFORD) (CIVIL, 2010) ME (BRADFORD) (CIVIL AND STRUCTURAL, 2010)
45294	TAM WAI SENG	BE HONS (KLiUC) (CIVIL, 2009)
30152	TAN ENG KHAI	BE HONS (UNITEN) (CIVIL, 2011)
45224	WIRA AZIZI BIN KADER	BE HONS (UTP) (CIVIL, 2011)
37252	WONG BAK SHIIUN	BE HONS (UTP) (CIVIL, 2008)
43697	YIP CHUN CHIEH	BE HONS (SWINBURNE) (CIVIL, 2012) ME (UTM) (CIVIL-STRUCTURE, 2014) PhD (UTM) (2018)
KEJURUTERAAN ELEKTRIKAL		
48635	GANESH DEVAN A/L SUBRAMANIAM	BE HONS (UTHM) (ELECTRICAL, 2013)
89544	HO SHUN TEN	BE HONS (UTeM) (ELECTRICAL (INDUSTRIAL POWER), 2014)
93709	MOHD NASHRIQ BIN MOHAMAD DAT	BE HONS (UiTM) (ELECTRICAL, 2010)
60535	MOHD. ABDUL RAUP BIN PARSAT	BE HONS (UiTM) (ELECTRICAL, 2016) ME (UTM) (ELECTRICAL POWER, 2022)
57571	MUHAMAD MUSHIDI BIN MUSTAPA	BE HONS (UiTM) (ELECTRICAL, 2007)
101925	NADIA ZAHIRAH BINTI ABD RAJIED	BE HONS (CURTIN) (ELECTRICAL POWER, 2009)
79604	OEH ZHE HAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2018)
91011	RAJKIRAN SINGH A/L GURBACHAN SINGH	BE HONS (UNITEN) (ELECTRICAL POWER, 2012) ME (UNITEN) (ELECTRICAL, 2016)
52966	RICKSON BIN LIMANIS	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2014)
58634	RIDWAN BIN MOKHTAR	BE HONS (UiTM) (ELECTRICAL, 2011)
53021	SEAH YEE EN	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2015)
95876	STEINOLD PAULI	BE HONS (UTHM) (ELECTRICAL (TELECOMMUNICATION), 2007)
116700	TIANG TOW LEONG	BE HONS (USM) (ELECTRICAL, 2009)
87404	VIGNESWARAN A/L M RATNAM	BE HONS (UniMAP) (ELECTRICAL SYSTEMS, 2008)
99436	ZULFADLIZAN BIN MOHD	BE HONS (UNITEN) (ELECTRICAL POWER, 2015)
KEJURUTERAAN ELEKTRONIK		
25879	NGU SZE SONG	BE HONS (MMU) (ELECTRONICS, 2003) ME (ADELAIDE) (ELECTRICAL, 2004) PhD (GLASGOW) (ELECTRICAL AND ELECTRONICS, 2014)
KEJURUTERAAN GEOTEKNIK		
36287	DIANA BINTI CHE LAT	BE HONS (MALAYA) (CIVIL, 2007) MSc (UiTM) (CIVIL (GEOTECHNIQUE), 2013) PhD (UTM) (CIVIL, 2021)
48481	KHOO LAI PENG	BE HONS (UMP) (CIVIL, 2010)
31253	TEH ZHI HUAN	BE HONS (MALAYA) (CIVIL, 2009) ME (UTM) (CIVIL-GEOTECHNICS, 2015)
KEJURUTERAAN KIMIA		
70023	KU MOHAMAD AFIQ BIN KU ARSHAD	BE HONS (UTM) (CHEMICAL, 2017)
111794	LAU SWEE LEONG	BE HONS (UTP) (CHEMICAL, 2004)
54324	YA MOHAMMAD NAZIR SYAH BIN ISMAIL	BE HONS (UTM) (CHEMICAL - POLYMER, 2009) Mphil (UTM) (CHEMICAL, 2019)
27972	ZAIRI BIN ZAINUDDIN	BE HONS (UTM) (CHEMICAL, 2000)
KEJURUTERAAN KOMPUTER		
56508	MARNI AZIRA BINTI MARKOM	BE HONS (KUKUM) (COMPUTER, 2006) MSc (UNiMAP) (COMPUTER, 2009) PhD (UNiMAP) (MECHATRONIC, 2018)
KEJURUTERAAN MEKANIKAL		
50023	ABANG MOHAMMAD SYAFFIQ IDZUAN BIN RAZAK	BE HONS (UPNM) (MECHANICAL, 2012)

Keahlian

95868	AZREEL ZAIREE BIN OMAR	BE HONS (UTP) (MECHANICAL, 2012)
111172	HO YEE JIAN	BE HONS (MALAYA) (MECHANICAL, 2009)
107596	MOHAMAD MASRIHAN BIN SIBOR	BE HONS (UTM) (MECHANICAL, 2018)
52489	MOHAMMAD FAEIZ BIN ISMAIL	BE HONS (UiTM) (MECHANICAL, 2006) MSc (LOUGHBOROUGH) (LOW ENERGY BUILDING SERVICES ENGINEERING, 2016)
45779	MOHD FAIZ BIN AHMAD SHAHROM	BE HONS (UTP) (MECHANICAL, 2009)
42025	MOHMIN BIN SALIM	BE HONS (UTM) (MECHANICAL, 2009)
94128	MUHAMMAD SYAKIRIN BIN RAZAKI	BE HONS (UNITEN) (MECHANICAL, 2008)
73516	NASIRUDDIN ZHARIFF BIN RASIP	BE HONS (UTP) (MECHANICAL, 2014)
50205	PREMANAND A/L NANU	BE HONS (NORTHUMBRIA) (MECHANICAL, 1997)
38822	SALIKKA A/P LIM CHUNG SENG	BE HONS (MALAYA) (MECHANICAL, 2011)
105604	WANG HUI LER	BE HONS (QUEENSLAND) (MECHANICAL, 2016)

KEJURUTERAAN MEKATRONIK

93571	CHIA KOK SIANG	BE HONS (UTAR) (MECHATRONICS, 2011)

PEMINDAHAN KEPADA AHLI (MELALUI PEPERIKSAAN PENILAIAN PROFESIONAL)

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
26614	EZUAN BIN JAMADON	BE HONS (UTM) (CIVIL, 2006)
42646	MOHAMMAD MASRUR BIN ABDUL AZIZ	BE HONS (UTM) (CIVIL, 2010)
66373	MOHD IQBAL BIN MOHD ZAINUDDIN	BE HONS (UTM) (CIVIL, 2009)
73086	MOHD KHAMDY BIN MUKHTARUDDIN	BE HONS (UTM) (CIVIL, 2009)
75274	MOHD SAUFI BIN MOHD REDZUAN	BE (SAITAMA) (CIVIL AND ENVIRONMENTAL, 2011) ME (SAITAMA) (ENVIRONMENTAL SCIENCE AND CIVIL, 2018)
47873	SITI HAJAR BINTI MANSOR	BE HONS (UTHM) (CIVIL, 2013) ME (UTHM) (CIVIL, 2016)
KEJURUTERAAN ELEKTRIKAL		
16123	TEY CHAI HENG	BE HONS (MALAYA) (ELECTRICAL, 1994)
KEJURUTERAAN KIMIA		
25771	AHMAD RAFIZAN BIN MOHAMAD DAUD	BE HONS (UKM) (CHEMICAL & PROCESS, 1999) MSc (SHEFFIELD) (ENVIRONMENTAL & ENERGY, 2004) PhD (IMPERIAL) (2012)
KEJURUTERAAN MEKANIKAL		
75332	ANG JEN KEN	ME HONS (MECHANICAL, 2010)
52335	MOHD SHAZWAN BIN ABD KHALID	BE (RAVENSBURG-WEINGARTEN) (MECHANICAL (AUTOMOTIVE), 2010) ME (MALAYA) (MECHANICAL, 2014)

PERMOHONAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
120888	ALVONNA @ FARHANAH JAMMY	BE HONS (UiTM) (CIVIL, 2007) ME (UTM) (CIVIL, 2019)
119668	FONG KIM WAI, EDWIN	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2012)
119669	HAZLAN BIN ABDUL RAHMAN	BE HONS (UKM) (CIVIL & STRUCTURE, 2000)
119674	IZHAM BIN ASHAB @ IZHAB	BE HONS (UTM) (CIVIL, 2000)
119671	MOHD TAHA BIN SUMAN	BE HONS (UTM) (CIVIL, 2010)
119677	MUHAMAD AZRULANUAR BIN ZAKARIA	BE HONS (UTM) (CIVIL, 2006)
119679	NUR HANIS BINTI HASSAN	BE HONS (UiTM) (CIVIL, 2010)
120889	NURUL DIANA BINTI RAUZAN	BE HONS (UiTM) (CIVIL, 2009) MSc (UiTM) (CIVIL (CONSTRUCTION), 2013)
119680	TAN CHEE KIAN	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2008)
KEJURUTERAAN ELEKTRIKAL		
120890	NOOR FAZILAH AYU BT SUHURANI	BE HONS (UTHM) (ELECRICAL, 2010)
KEJURUTERAAN ELEKTRONIK		
120881	FAUZIYAH BINTI SALEHUDDIN	BE HONS (UiTM) (ELECTRICAL, 2001) MSc (UKM) (MICROELECTRONICS, 2004) PhD (UNITEN) (2012)
KEJURUTERAAN GEOTEKNIK		
119672	ZULKIFLI BIN ISMAIL	BE HONS (USM) (CIVIL, 2001)
KEJURUTERAAN KIMIA		
120880	LAI SHIOU POH	BE HONS (UTM) (CHEMICAL, 2009)
KEJURUTERAAN MEKANIKAL		
120884	DARENCE SENAWAT MATIUS	BE HONS (UKM) (MECHANICAL, 2011)
120885	KAMARUL IDZHAM BIN KAMLUDIN	BE HONS (UTM) (MECHANICAL-MARINE TECHNOLOGY, 2004)
119675	MAT NIZI BIN MAMAT	BE HONS (UiTM) (MECHANICAL, 2001)
119676	MOHAMAD NOR AMALLIL BIN MUSTAFA	BE HONS (UM) (MECHANICAL, 2015)
119670	MOHAMAD ZAKI BIN MAHATHIR	BE HONS (UTeM) (MECHANICAL (STRUCTURE & MATERIAL), 2008) ME (UMS) (OIL & GAS, 2018)
120886	MOHD IZZAT BIN MOHD THIYAUDDIN	BE (MINNESOTA) (MECHANICAL, 2009) PhD (QUT) (2014)
120887	MOHD SHAMSUL ARIFFIN BIN RAMLI	BE HONS (QUEENSLAND) (MECHANICAL, 2010)
120883	NORAZLIANIE BINTI SAZALI	BE (UMP) (MECHANICAL, 2012) ME (UTHM) (MECHANICAL, 2015) PhD (UTM) (GAS, 2018)
120882	TAN SZE TIEN, MARK	BE (QUEENSLAND) (MECHANICAL, 2015)
N/A	YEE CHEE HSIEN	BE HONS (CURTIN) (MECHANICAL, 2010)

PERMOHONAN MENJADI AHLI (MELALUI PEPERIKSAAN PENILAIAN PROFESIONAL)

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
119673	ADY BIN ADNAN	BE HONS (UTHM) (CIVIL, 2008)
KEJURUTERAAN ELEKTRIKAL		
119678	NIK MOHD BAKHRY BIN ABU BAKAR	BE HONS (UTM) (ELECTRICAL, 2000)

PEMINDAHAN KEPADA AHLI 'SENIOR'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRIKAL		
43517	SURAJ SHASTRI A/L NADARAJAN	BE HONS (UNITEN) (ELECTRICAL, 2008)
KEJURUTERAAN SUMBER MINERAL		
29989	MOHD AMIR HAFIZ BIN HASMIN	BE HONS (USM)(MINERAL RESOURCES, 2009)

PERMOHONAN KEPADA AHLI 'SENIOR GRADUATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRONIK		
119913	KAMAL RIZWAN BIN MUZAHAR	BE (Mc MASTER UNI.) (ELECTRICAL, 2013)
KEJURUTERAAN MEKANIKAL		
119912	MOHD HAFEZ BIN. AB. KARIM	BE HONS (UNITEN) (MECHANICAL, 2001)
KEJURUTERAAN SUMBER MINERAL		
121088	ZULAIKA BINTI ZAKARIA	BE HONS (USM) (MINERAL RESOURCES, 2011)

PERMINDAHAN KEPADA AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
111253	SAIFUDDIN NUR AKMAL BIN SOHAIMI	BE HONS (IIUM) (CIVIL, 2022)
85399	GILLSON GILBERT TIWOL	BE HONS (MIU) (CIVIL, 2019)
80408	YU CHIA SHENG	BE HONS (SEGI UNI.) (CIVIL, 2022)
88621	MOHAMAD NORAZWAN BIN AZMI	BE HONS (SWINBURNE UNI. OF TECH.) (CIVIL, 2018)
99104	TAN HUI ENG, ESTHER	BE HONS (SWINBURNE UNI. OF TECH.) (CIVIL, 2021)
107453	LEONG YI SHENG, AARON	BE HONS (SWINBURNE UNI. of TECH.) (CIVIL, 2022)
111978	MUHAMAD AFIQ BIN ANUAR	BE HONS (UiTM) (CIVIL - INFRASTRUCTURE, 2022)
76089	NUR IMANI BINTI YUSOFF CHEAH	BE HONS (UKM) (CIVIL & STRUCTURAL, 2015)
28410	MOHD ALJAZIRI BIN YUSOF	BE HONS (UM) (CIVIL, 2008)
59251	ANIS AYESHA BT. NORAINI	BE HONS (UMP) (CIVIL, 2016)
115112	AMERUL AFIQ BIN ABDUL KADIR	BE HONS (UMP) (CIVIL, 2022)
88926	NADIAH BINTI SABANA	BE HONS (UMS) (CIVIL, 2018)
114089	DAYANG SITI AFIQAH BINTI ABANG KAMARUD-DIN	BE HONS (UNIMAS) (CIVIL, 2022)
95681	ADI IZZUDDIN BIN RAMLEE	BE HONS (UNITEN) (CIVIL, 2020)
115807	THANESH NAIDU A/L SEKHAR	BE HONS (USM) (CIVIL, 2022)
104404	SIOW YEE WEN	BE HONS (UTAR SG LONG) (CIVIL, 2023)
107690	TEE SIN HUI	BE HONS (UTAR SG LONG) (CIVIL, 2023)
80420	KOK CHIEW YEE	BE HONS (UTAR) (CIVIL, 2019)
85019	CHOY WEN JUN	BE HONS (UTAR) (CIVIL, 2020)
54916	NORAIN BT JANAIN	BE HONS (UTHM) (CIVIL, 2016) ME (UTHM) (CIVIL, 2021)
100405	RAJA HARIZ NAJMI BIN RAJA HAIRUL NIZAM	BE HONS (UTHM) (CIVIL, 2021)
106738	MUHAMMAD 'AFIF BIN MUHAMMED MISMAN	BE HONS (UTHM) (CIVIL, 2022)
110179	MUHAMAD AIDIL FITRI BIN SABRAH	BE HONS (UTHM) (CIVIL, 2022)
103325	UMESWARAN A/L LETCHUMANAN	BE HONS (UTM) (CIVIL, 2022)
117102	MOHD AZRIN SAFIQ BIN MD ZAIN	BE HONS (UTM) (CIVIL, 2022)
94079	KHALID AHMED FAKHRUDDIN	ME (UTM) (CIVIL & STRUCTURE, 2019)
KEJURUTERAAN BAHAN		
118874	CYNTHIA SUMANG UJANG	BE HONS (UniMAP) (POLYMER, 2022)
KEJURUTERAAN BIO-PERUBATAN		
107691	HIU WEI XIN, THERESA	BE HONS (UTAR SG LONG) (BIO-MEDICAL, 2023)
KEJURUTERAAN ELEKTRIKAL		
36598	SHAHRIZAL BIN ISKANDAR RIDHUAN	BE (UMP) (CONTROL & INSTRUMENTATIONS, 2010)
88346	PRANETAA NAIR A/P C KRISHNA KUMAR	BE HONS (APU) (ELECTRICAL & ELECTRONIC, 2020)
79175	MUHAMMAD RIDWAN BIN ZULAMRAN	BE HONS (UMP) (ELECTRICAL - POWER SYSTEM, 2017)
86458	JEYASHANKAR A/L JEYARAJAH	BE HONS (UPNM) (ELECTRICAL & ELECTRONIC POWER ENG., 2020)
54105	CHEW HAN SIONG	BE HONS (USCI UNI.) (ELECTRICAL & ELECTRONIC, 2015)
91000	THIVAGAR A/L RAJA KUMAR	BE HONS (USM) (ELECTRICAL, 2020)
104419	CHEW YAN ZHE	BE HONS (UTAR SG LONG)(ELECTRICAL & ELECTRONIC, 2023)
74139	MUHAMMAD AIMAN BIN MOHMAD	BE HONS (UTeM) (INDUSTRIAL POWER, 2017)
76765	MUHAMMAD AFIQ NASRULLAH BIN MUHAMMAD HISHAM	BE HONS (UTHM) (ELECTRICAL, 2018)
111967	WAN ZULHILMI BIN WAN MOKHTAR	BE HONS (UTM) (ELECTRICAL, 2022)
KEJURUTERAAN ELEKTRONIK		
86443	MOHD NAIM BIN ZAINOL RASHID	BE HONS (UPNM) (ELECTRICAL & ELECTRONIC-COMMUNICATION ENG., 2019)
KEJURUTERAAN KIMIA		
108158	HU ZHANG WEI	BE HONS (UM) (CHEMICAL, 2021)
90449	SOO YANG KAE	BE HONS (UMP) (CHEMICAL, 2020)
17917	MUHAMMAD NAJIB BIN JAAFAR	BE HONS (UPM) (CHEMICAL, 1999)
89343	KOAY YONG JIAN	BE HONS (UTAR) (CHEMICAL, 2019)

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