SIGNIFICANCE

As a highway operator, Innovation & Technology are at the heart of our strategy for managing and expanding our network. These elements are crucial for ensuring safety, efficiency, and sustainability. They are foundational to our commitment to leading the industry with advanced practices, driving operational excellence, and promoting sustainable growth.

Our commitment to incorporating the latest technology and innovative solutions drives us forward, enhancing user experience and safety for all road users while equipping our employees with tools to optimise performance and excellence. This approach allows us to respond dynamically to transportation demands, ensuring the safety of our roads and empowering our team to deliver their best, thus meeting the evolving needs of our industry.

OUR APPROACH
INNOVATION & TECHNOLOGY

01 ADVANCING ROAD SAFETY WITH INNOVATION AND TECHNOLOGY

02 OPTIMISING OPERATIONAL EFFICIENCY AND EFFICACY

03 DECISION-MAKING POWERED BY ADVANCED ANALYTICS DASHBOARD

Our comprehensive strategy in addressing Innovation & Technology is segmented into three interconnected pillars, each being key to this material matter.

01: Harnessing the power of cutting-edge solutions to transform highway security. This approach embodies our commitment to leveraging the latest advancements, ensuring safer commuting experiences for all users.

02: Streamlining processes for peak performance. This focus underscores our commitment to refining operations, ensuring unparalleled productivity and effectiveness across all facets of our organisation.

03: Enhancing strategic choices with data-driven insights. This platform revolutionises our approach to critical decision-making, harnessing sophisticated analytics to guide operations and strategies.

INNOVATION & TECHNOLOGY

01 ADVANCING ROAD SAFETY WITH INNOVATION AND TECHNOLOGY

We utilise the latest and most advanced technologies to improve highway security, focusing on enhancing the safety of commuters. Our approach is to provide secure and reliable facilities for all road users by harnessing the power of cutting-edge solutions and innovation. Our commitment to leveraging the latest advancements is paving the way for a safer and more efficient commuting experience for everyone.

1 SMART SURVEILLANCE SYSTEM (S3)

Our cutting-edge home-grown solution, empowered by AI technology, has transformed the landscape of highway inspections and monitoring. Aptly named, S3 seamlessly integrates our Traffic Management Centre, patrolling, maintenance and IT functions, providing a unified platform for real-time highway oversight and issue detection.

This holistic approach enhances safety on our highways and ensures swift and effective maintenance works and emergency response when needed most.

S3 is a testament to our commitment to leveraging technology to improve highway operations. It offers a comprehensive and efficient solution for monitoring and safeguarding our highways.

2 DIGITAL ASSIST

Our home-grown, innovative Digital Assist application has revolutionised the conventional emergency call system, streamlining and modernising how we respond to critical situations. This state-of-the-art platform boasts an automated workflow, ensuring real-time alerts for swift resource deployment that significantly reduces response times.

With a simple press of a button, road users are now empowered to seamlessly request emergency assistance. Distinguishing this system is its innovative capability to immediately inform road users about the specific patrolman assigned to their situation, along with an estimated time of arrival. This feature provides reassurance during critical moments and guarantees a swift response when it is most needed. This pivotal function significantly elevates safety standards and underscores our steadfast commitment to offering efficient and dependable emergency assistance services.

> "Our Digital Assist app transforms emergency response with real-time alerts, seamless user interaction, and direct access to patrolmen for swift assistance, ensuring safety on the road.
>
> **En. Anual Abdullah**
> Senior Manager,
> Innovation & Technology

3 SMART SLOPE MONITORING SYSTEM

Our slope monitoring system lies at the intersection of innovation and safety, exemplifying a revolutionary approach to highway security. These cutting-edge systems employ advanced technology to detect early signs of landslides or slope failures, establishing themselves as pioneering safety mechanisms.

By proactively leveraging technological advancements, our systems possess the unique capability to identify potential slope instability in real time. This proactive approach empowers us to initiate timely maintenance and repair works, effectively preventing costly and extensive damage that could compromise the integrity of our highway infrastructure.

Our commitment to innovation extends far beyond safety alone. It resonates deeply with our environmental responsibilities. These systems actively preserve nearby ecosystems by preventing large-scale landslides and soil erosion, aligning seamlessly with our broader ecological sustainability goals.

1.

The application monitors rainfall activity remotely and notifies our engineers when rainfall exceeds the determined limits of Alert (>31 mm), Action (>45 mm), and Alarming (>60 mm).

2.
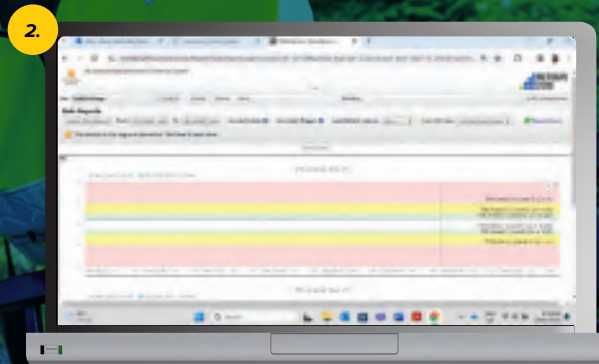
The application monitors slope activity remotely and triggers our engineers when tilting surpasses the determined limit.

3.
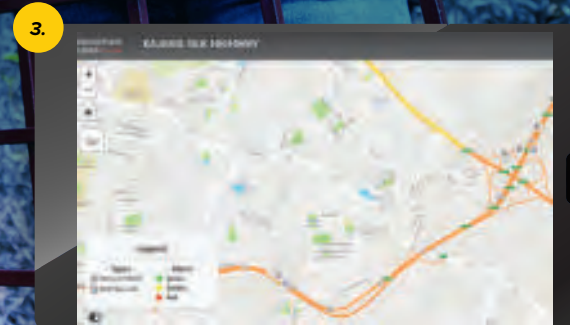
PROLINTAS Web-Based Slope Monitoring Dashboard displays the locations and integrity of the slope structures.

02 OPTIMISING OPERATIONAL EFFICIENCY AND EFFICACY

Our commitment to constant refinement and optimisation is rooted in our desire to serve our stakeholders better. We tirelessly work towards achieving higher levels of efficiency and effectiveness in every aspect of our operations, from our processes and systems to our dedicated team and culture. This focus on improvement ensures that we consistently deliver results that meet and exceed expectations as we continue optimising our business.

Communications towers erected along PROLINTAS highways ensure uninterrupted cellular and wireless communication coverage for drivers and passengers, enhancing safety, connectivity and convenience during travel. In addition, these towers support various other communication needs, such as emergency services, logistics and infrastructure monitoring along the highways.

1 SOFTWARE-DEFINED WIDE AREA NETWORK (SD-WAN) & INTERNET PROTOCOL VIRTUAL PRIVATE NETWORK (IPVPN)

Within our entire highway network, including our headquarters, we have deployed a comprehensive and secure network connectivity framework. This system stands out for its seamless fusion of two parallel connectivity solutions, eliminating the need for an extensive fibre optic cable network. Through this innovative strategy, we ensure secure network connections supported by rapid and uninterrupted data transmission.

As a result, we achieve near-zero downtime, providing us with the flexibility and quick response capability to meet the demands of highway management. This approach enhances operational efficiency and highlights our commitment to maintaining high standards of reliability and security in our network infrastructure.

2 ROBUST CYBERSECURITY MEASURES

We employ a multi-layered firewall system and centrally managed endpoint security to intercept and neutralise threats. Our network is thoughtfully structured with internal and external segmentation to minimise exposure to threats and deter attackers. Regular Vulnerability Assessment and Penetration Testing (VAPT) ensures the resilience of our defences by identifying and addressing vulnerabilities.

All the computers in our network are equipped with the latest anti-virus protection, bolstered by robust network accessibility controls governed by Active Directory (AD). With these controls, we establish a formidable defence to maximise cyber security.

3 4G LTE BACKUP CONNECTIVITY

We have strategically implemented 4G LTE backup connectivity at every toll plaza, ensuring a resilient safety net against any potential disruptions in fibre connectivity. This advanced technology is prepared to activate instantaneously, should there be any lapse in the primary network, thereby guaranteeing seamless connectivity and the continuation of toll operations without interruption.

Our adoption of this backup solution underscores our dedication to operational continuity, enabling us to maintain our services around the clock, every day of the year. This commitment to reliability ensures that the toll experience for our users remains consistent and efficient, irrespective of any challenges that may arise.

4 NGT SYSTEMS – FLEET MANAGEMENT TECHNOLOGY

Our real-time vehicle monitoring system includes the continuous tracking of vehicle maintenance, movement, and location, coupled with the vigilant monitoring of driving behaviour, fuel consumption, and speed, all facilitated through cutting-edge GPS technology and real-time data analysis.

This system lets us meticulously analyse vehicle trips and events while providing timely notifications to the relevant departments. The result is enhanced efficiency and safer and more streamlined operations, ensuring that we maintain the highest performance and safety standards at all times.

5 ENTERPRISE APPLICATION @ CLOUD

Leveraging the capabilities of cloud-based technologies, we have developed an accessible, high-performance, and dependable solution that serves as part of our operational strategy. This synergistic integration allows us to streamline our processes, enhance productivity, and ensure precision in our work, all while providing a seamless and user-friendly experience.

Our commitment to embracing the forefront of technological innovation reflects our dedication to excellence in service provision. By utilising Oracle ERP alongside Cloud-Powered Office 365, we set a benchmark for efficiency and excellence within our industry, affirming our position as leaders in establishing industry standards.

Real-time monitoring is crucial for PROLINTAS' operations and road users as it enhances safety by monitoring traffic flow, managing incidents and ensuring quick response to emergencies. It further aids in optimising traffic management, deterring criminal activities and analysing data for infrastructure planning and operational efficiency.

6 SMART LIGHTING SYSTEM FOR STREET LIGHTING

Our lighting infrastructure embodies intelligent and sustainable lighting solutions, seamlessly integrated within a network-connected framework. This advanced system enables the optimisation of maintenance schedules and the remote adjustment of lighting levels, facilitating significant energy savings and cost reduction.

A distinctive feature of our system is the implementation of smart dimming technology during off-peak hours, specifically from midnight to 7 am, where the illumination intensity is progressively reduced to 50%.

7 MOTION SENSOR LIGHTING

This application introduces smart, energy-efficient technology transforming our approach to lighting spaces. This system autonomously manages lighting based on movement, improving energy savings, lowering operational costs and increasing security in our buildings.

8 ELECTRONIC DOCUMENT MANAGEMENT SYSTEMS (eDMS)

With eDMS, we are transforming how we prepare and issue documents, from Memorandums to Management Papers and Service Request Forms across various domains like legal, secretariat, quality, safety, training, and more.

Time is a valuable resource, and eDMS recognises its significance. It minimises the time required for seeking approvals, document submission, and retrieval, streamlining our operations for maximum efficiency. Beyond time, eDMS saves on costs associated with traditional paper usage and cartridges and optimises office space by reducing the need for document storage rooms.

As part of our commitment to sustainability, eDMS plays a pivotal role. By reducing the reliance on physical paperwork, we actively contribute to preserving trees, aligning with our broader environmental goals.

Smart lighting along PROLINTAS highways enhances safety and efficiency by providing adaptive illumination levels based on traffic conditions and time of day. This reduces energy consumption and light pollution while ensuring optimal visibility for drivers, thus contributing to overall road user comfort and safety.

THE ADVANTAGES OF USING eDMS
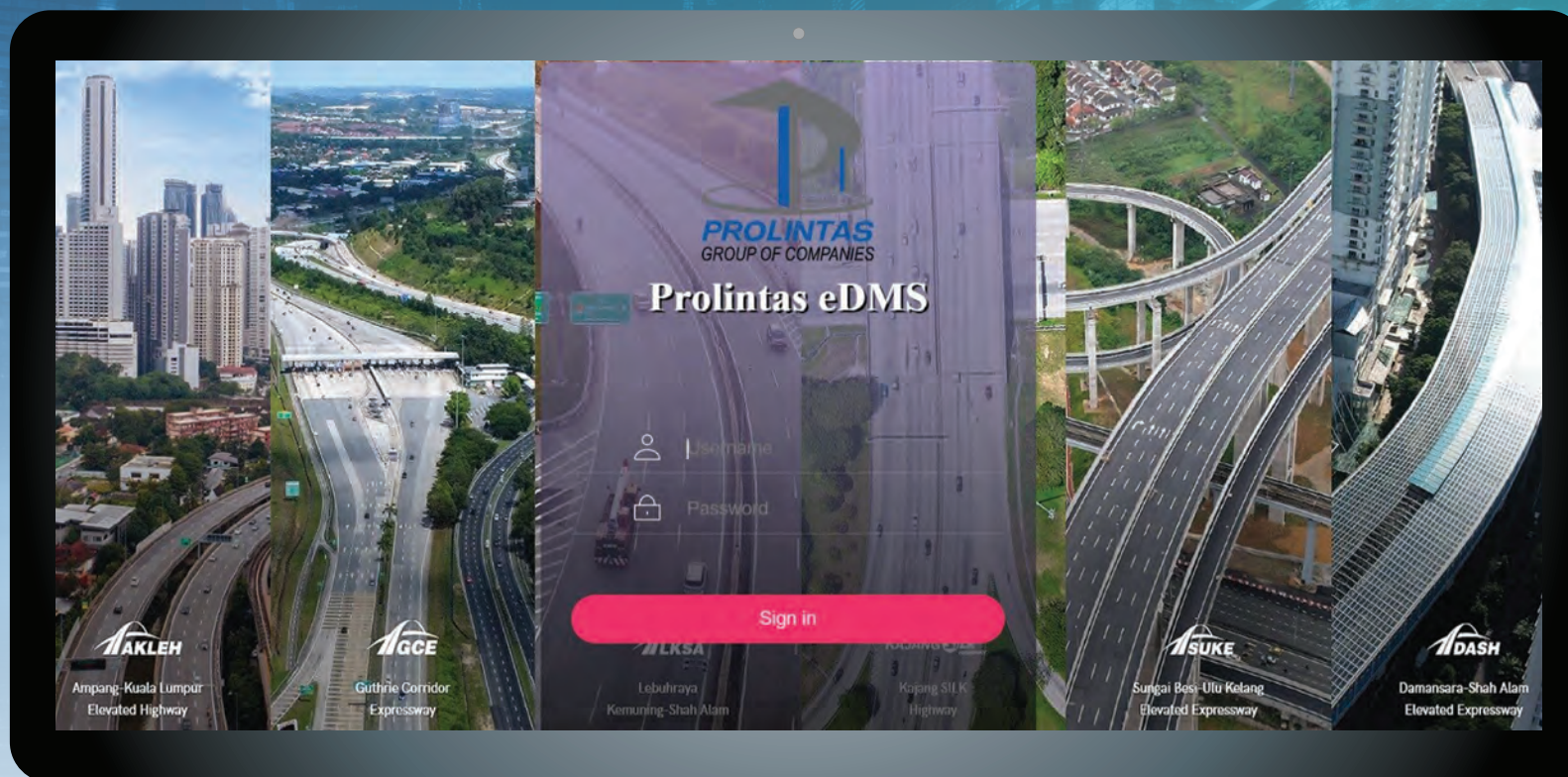
Transformative shift towards a paperless organisational ecosystem.

Centralised document storage for streamlined management and enhancing access control for improved security.

Improving workflow processes, thereby catalysing a marked increase in organisational efficiency.

CENTRALISED CALL CENTRE (CCC)

On 1 April 2023, we introduced a unified Hotline Number and email system for complaints across all our highways. This key improvement guarantees that regardless of which highway you are travelling on, there will be a singular, consistent point of contact for assistance or feedback.

This consolidated approach enables us to enhance traffic management operations, accelerate emergency responses and significantly improve the caliber of our customer service.

The Centralised Call Centre is essential for managing and coordinating various aspects such as traffic flow, incident response and maintenance activities. It also expedites informed decision-making, ensuring the safety and security of road users. This optimises resource allocation, contributing to smoother traffic flow and overall operational efficiency on highways.

OUR CASE STUDY

03 DECISION-MAKING POWERED BY ADVANCED ANALYTICS DASHBOARD

This innovative platform marks an advancement in our capacity to make well-informed decisions with confidence. Utilising the strength of sophisticated analytics, it delivers a comprehensive array of data-driven insights, enabling us to navigate towards success strategically. This tool empowers us to make strategic decisions with increased clarity and accuracy.

PROLINTAS' analytics dashboard features real-time data insights, allowing us to optimise traffic flow, swiftly respond to incidents and ensure road safety and operational efficiency along highways.

Innovative solutions that enhance precision and provide deeper insights are transforming the decision-making landscape. Leveraging advanced analytics capabilities, we introduce a fresh perspective on strategic planning enveloped in robust security and improved clarity. This prepares us to navigate the complexities of the marketplace with confidence and a forward-looking vision without overstating our capabilities.

CHALLENGES

DATA FRAGMENTATION AND DISPARATE FORMATS: Data are dispersed across various subsidiaries, divisions, and departments within PROLINTAS, lacking a uniform format. This fragmentation hinders effective data analysis and strategic decision-making, creating inefficiencies across the organisation. It underscores the critical need for a more streamlined and integrated approach to maintaining data relevance and accuracy.

CONTINUOUS DATA UPDATE AND STRATEGIC PLANNING CHALLENGES: The necessity for ongoing manual updates to accurately track performance and inform strategic decisions presents a substantial challenge. Ensuring that data is consistently current is pivotal for sound decision-making, yet the limitations of the present data management infrastructure hinder this critical process. This situation not only leads to the inefficient use of valuable time, which could be allocated to more productive activities, but also underscores the need for an improved approach to data handling.

RISK OF DATA LOSS AND INTEGRITY ISSUES: Employee turnover introduces significant risks of data loss during transitions, leading to potential auditing discrepancies, reduced data integrity, and poor traceability. These issues not only affect operational efficiency but also pose a threat to the organisation's compliance and accountability standards. This can lead to misinformation and contradictions in PROLINTAS' communications.
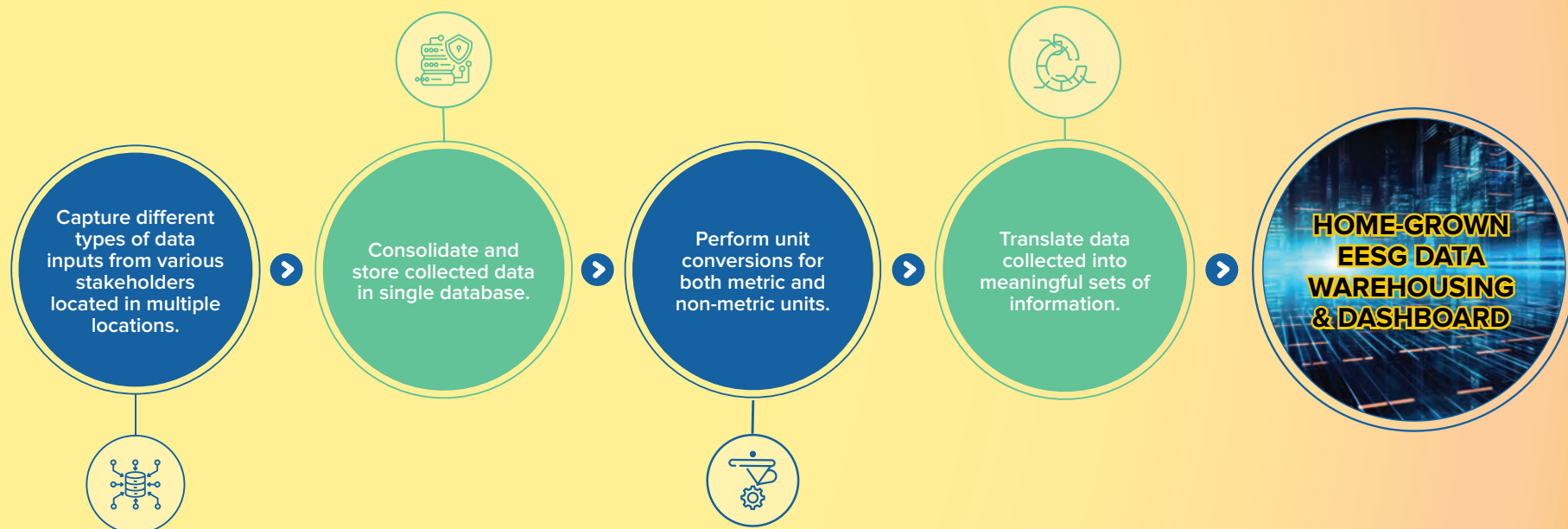
SOLUTION

HOME-GROWN EESG DATA WAREHOUSING AND DASHBOARD

Leveraging the power of an advanced analytics dashboard, we unlock data-driven insights, enabling strategic decisions to be made with greater clarity and precision. The core of this approach is a secured data repository paired with a robust reporting solution, ensuring the integrity and accessibility of critical information. This combination empowers us to navigate complex challenges confidently, transforming raw data into actionable intelligence.

We have established a dedicated EESG (Economic, Environmental, Social and Governance) Data Warehousing and Dashboard System to facilitate key activities, aiming for enhanced consolidation and robust data integration for analysis. This system is the foundation for improving our capabilities in managing and analysing EESG-related data, ensuring a comprehensive approach to sustainability and governance.

HOW OUR INTEGRATED EESG DATA WAREHOUSING AND DASHBOARD WORK
Securely protects sensitive data and documentation and mitigates the risk of data loss and theft to uphold data privacy.

Capture different types of data inputs from various stakeholders located in multiple locations.

→ Consolidate and store collected data in single database.

→ Perform unit conversions for both metric and non-metric units.

→ Translate data collected into meaningful sets of information.

→ **HOME-GROWN EESG DATA WAREHOUSING & DASHBOARD**

OUR CASE STUDY

Harnessing our EESG Data Warehousing and Dashboard, we extract pivotal information from our Traffic & Toll Collection Dashboard, which is integral for strategic oversight. This sophisticated tool provides real-time insights into traffic patterns and toll revenue, allowing for proactive traffic management and financial planning. It embodies our commitment to innovation and excellence, ensuring operational efficiency and sustainable revenue generation within the EESG framework.

TRAFFIC & TOLL COLLECTION DASHBOARD

OPTIMISATION OF FINANCIAL PERFORMANCE THROUGH DATA-DRIVEN TOLL MANAGEMENT

INSIGHTFUL ANALYTICS FOR ENHANCED BUSSINESS PERFORMANCE

Our dashboard is designed to convert raw data into actionable insights, thus simplifying complex information into easy-to-understand visuals. With its intuitive graphs and charts, we can promptly identify trends such as high traffic times and daily revenue, allowing us **to make strategic decisions without being overwhelmed by numbers.**

This tool serves as our analytical lens, providing a clear view of the toll revenue performance woven through traffic patterns and toll collections, which is critical for forecasting and optimising financial outcomes.

PROACTIVE ALERTS FOR OPERATIONAL EFFICIENCY

The system is our vigilant sentinel, scanning for irregularities or disruptions.

It promptly **alerts us to aberrations, from toll booth malfunctions to traffic surges, facilitating an immediate response.**

This responsiveness ensures operational continuity and contributes to the economic pillar of our sustainability by minimising downtime and maximising throughput.
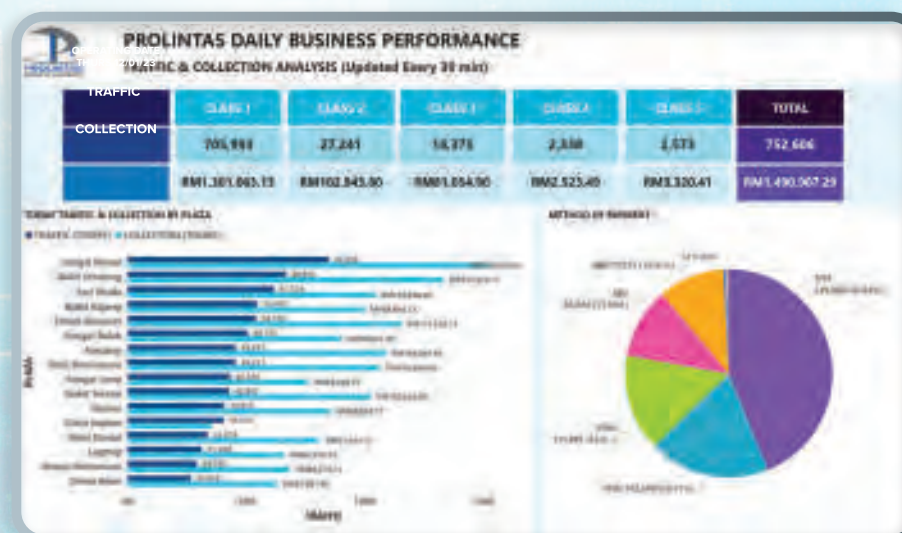
Insightful Overview: Navigating Through PROLINTAS' Daily Traffic Patterns and Revenue Streams

FINANCIAL OVERSIGHT FOR SUSTAINABLE GROWTH

This dashboard segment provides a transparent view of the fiscal vitality of our operations. Acting as our economic compass, it **navigates us through revenue streams and payment method preferences and helps reconcile collections.**

By closely monitoring these financial metrics, PROLINTAS can sustain economic growth, optimise asset utilisation and contribute to broader sustainability goals through prudent financial management.

ENHANCING ROAD SAFETY WITH REAL-TIME TRAFFIC MONITORING

NEAR REAL-TIME DATA COLLECTION & ANALYSIS

The dashboard we offer can provide real-time updates on traffic dynamics.

This is achieved by **refreshing data on toll transactions every 30 minutes,** allowing for continuous monitoring of the volume of vehicles and emerging traffic patterns. This ability to oversee traffic immediately is akin to an eagle's keen vision, affording PROLINTAS an advantageous position in terms of traffic management.

STRATEGIC TRAFFIC ANALYSIS FOR SMOOTHER JOURNEYS

Our traffic dashboard collects real-time data on traffic patterns, helping us gain a deeper understanding of how commuters travel throughout the day.

By analysing this data, we can **identify peak travel times, busy routes, and common commuter behaviours** that affect traffic efficiency. This information is crucial in assessing the effectiveness of our highway infrastructure.

With this knowledge, PROLINTAS can develop targeted strategies to manage and improve traffic flow, ensuring smoother journeys for everyone.

DATA-DRIVEN DECISIONS FOR TRAFFIC MANAGEMENT EXCELLENCE

The near real time feed displayed on the dashboard is a key instrument in improving road safety and traffic management. By enabling us to monitor vehicle movement in real-time, we can **optimise traffic flow, and allocate resources** to maintain safety standards.

This proactive approach ensures a seamless journey for commuters. It is symbolic of PROLINTAS' commitment to the social aspects of sustainability, where the safety of every commuter is a top priority.
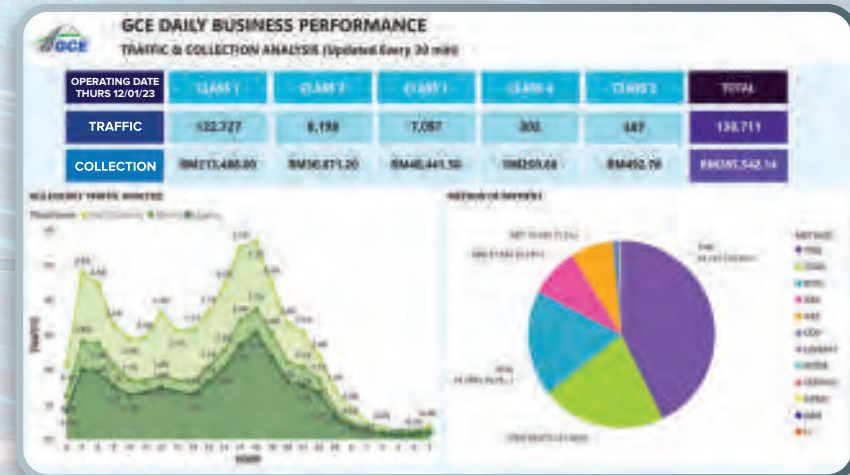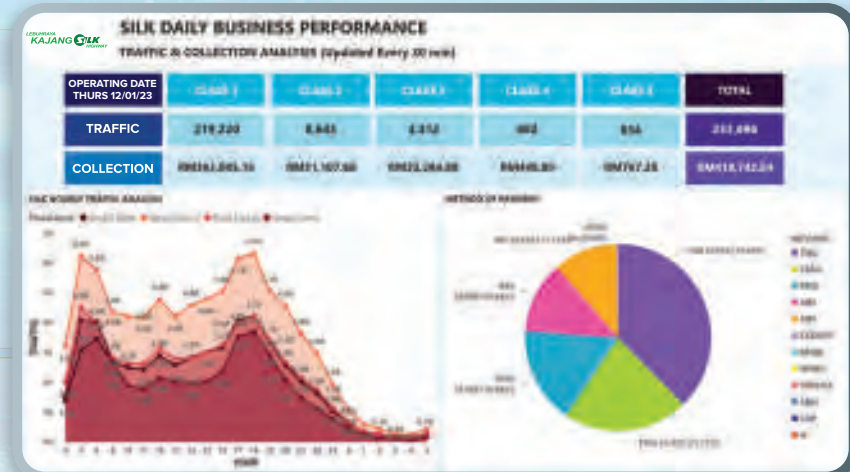
Through the Dashboard, we monitor traffic volume and payment methods of our road users.

OUR CASE STUDY

Our EESG Data Warehousing and Dashboard System extends beyond the Traffic and Toll Collection Dashboard to encompass a thorough environmental stewardship function, delivering intelligent insights into critical sustainability metrics. It serves as a comprehensive platform for environmental oversight, facilitating the monitoring and analysing of environmental performance. This integration of key environmental data enables us to uphold our commitment to sustainability, driving strategic initiatives that align with global ecological goals. Through this system, PROLINTAS champions operational efficiency and reinforces its dedication to environmental responsibility. Each dashboard is instrumental in our pursuit of sustainable development and continuous environmental improvement.
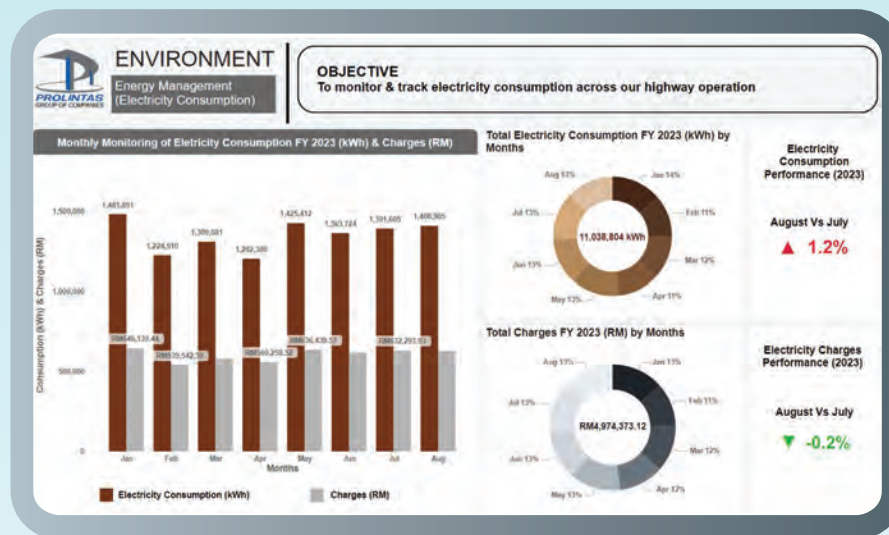
CARBON MANAGEMENT DASHBOARD
Our Carbon Management Dashboard meticulously tracks and reports on GHG emissions, enabling us to identify trends, set reduction targets, and implement strategies following environmental best practices. This tool is fundamental to minimising the carbon footprint of our operations and contributing to global climate action initiatives.
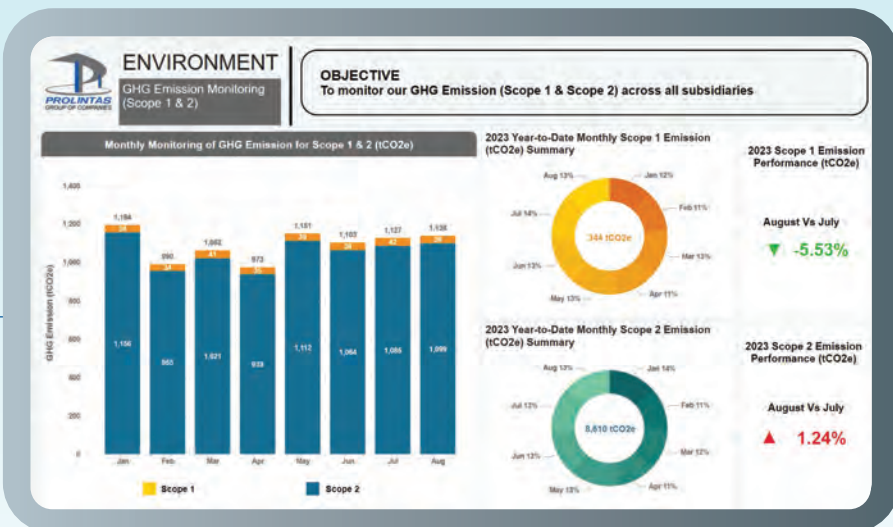
The Carbon Management Dashboard meticulously tracks and reports on our GHG emissions.

ENERGY MANAGEMENT DASHBOARD
The Energy Management Dashboard stands as a key resource, delivering in-depth analytics on energy consumption patterns. Through the meticulous analysis of energy usage data, it enables us to identify opportunities for enhancing efficiency, effectively managing energy-related expenses, and advancing our initiatives towards the adoption of renewable energy sources. This tool is instrumental in optimising our energy strategy and sustainability efforts.
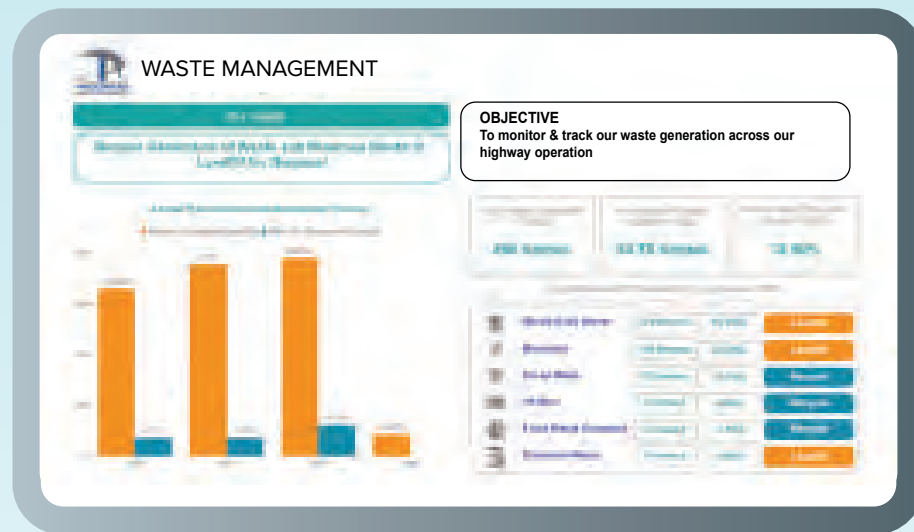
The Energy Management Dashboard stands for analytics on energy consumption patterns.
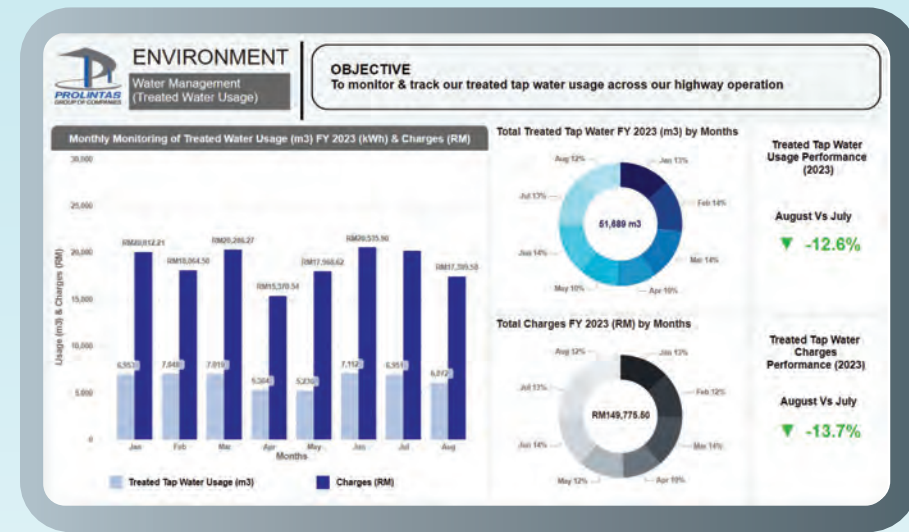
WASTE MANAGEMENT DASHBOARD

The Waste Management Dashboard provides an in-depth analysis of waste generation and disposal methods. It guides waste reduction efforts and promotes recycling and recovery practices. This dashboard is essential for managing environmental impact and aligning with regulatory compliance standards.

WATER MANAGEMENT DASHBOARD

We meticulously measure water usage across our operations through the Water Management Dashboard. This facilitates the optimisation of water resources, supports the identification of conservation opportunities, and underscores our dedication to responsible water stewardship.

The Waste Management Dashboard provides analysis of waste generation and disposal methods.

The Water Management Dashboard presents analytics of water consumption patterns.

GOING FORWARD

As we progress, our focus will remain resolute on our three essential pillars within Innovation and Technology. We are committed to transforming highway security with advanced technologies, optimising our processes for maximum efficiency and leveraging data-driven insights for strategic decision-making. This streamlined strategy highlights our dedication to excellence and positions us to address future challenges with agility and informed precision, ensuring ongoing innovation and impactful results.