



TECHNOLOGY ADOPTION FOR TOWNSHIP MANAGEMENT

10 June 2022

Frank Ngoh

General Manager/Secretary
Tampines Town Council
(managed by EM Services Pte Ltd)

TAMPINES TOWN COUNCIL

To be Singapore's first Model Eco-Town by 2025

Tampines Town Council was set up in **1990** to manage and maintain common property of HDB housing estates in Tampines which consists five divisions, namely, Central, East, West, North and Changkat.

Our Mission

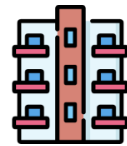
To make Tampines truly our best home where we live, work, play, bring up our children and grow old in peace, comfort and harmony.

Our Vision

"Tampines Together" is to develop a community that is actively engaged in five core areas:

- Learning
- Green
- Active
- Caring
- Creative

For a greater sense of belonging, building stronger ties, lead a more enticing life, stay healthy and together, Make Tampines Our Best Home.



68,012

HDB Residential Units



2,106

HDB Commercial Units



7,067

Parking Lots



OUR MPs



Mr Masagos Zulkifli

Minister for Social and Family Development
Second Minister for Health & Minister-in-charge of Muslim Affairs
Advisor to Tampines GROs
Elected Member of Parliament for Tampines GRC



Dr Koh Poh Koon

Senior Minister of State, Ministry of Health and
Senior Minister of State, Ministry of Manpower
Advisor to Tampines GROs
Elected Member of Parliament for Tampines GRC



Ms Cheng Li Hui

Chairman of Tampines Town Council
Advisor to Tampines GROs
Elected Member of Parliament for Tampines GRC



Mr Desmond Choo

Vice-Chairman of Tampines Town Council
Advisor to Tampines GROs
Elected Member of Parliament for Tampines GRC



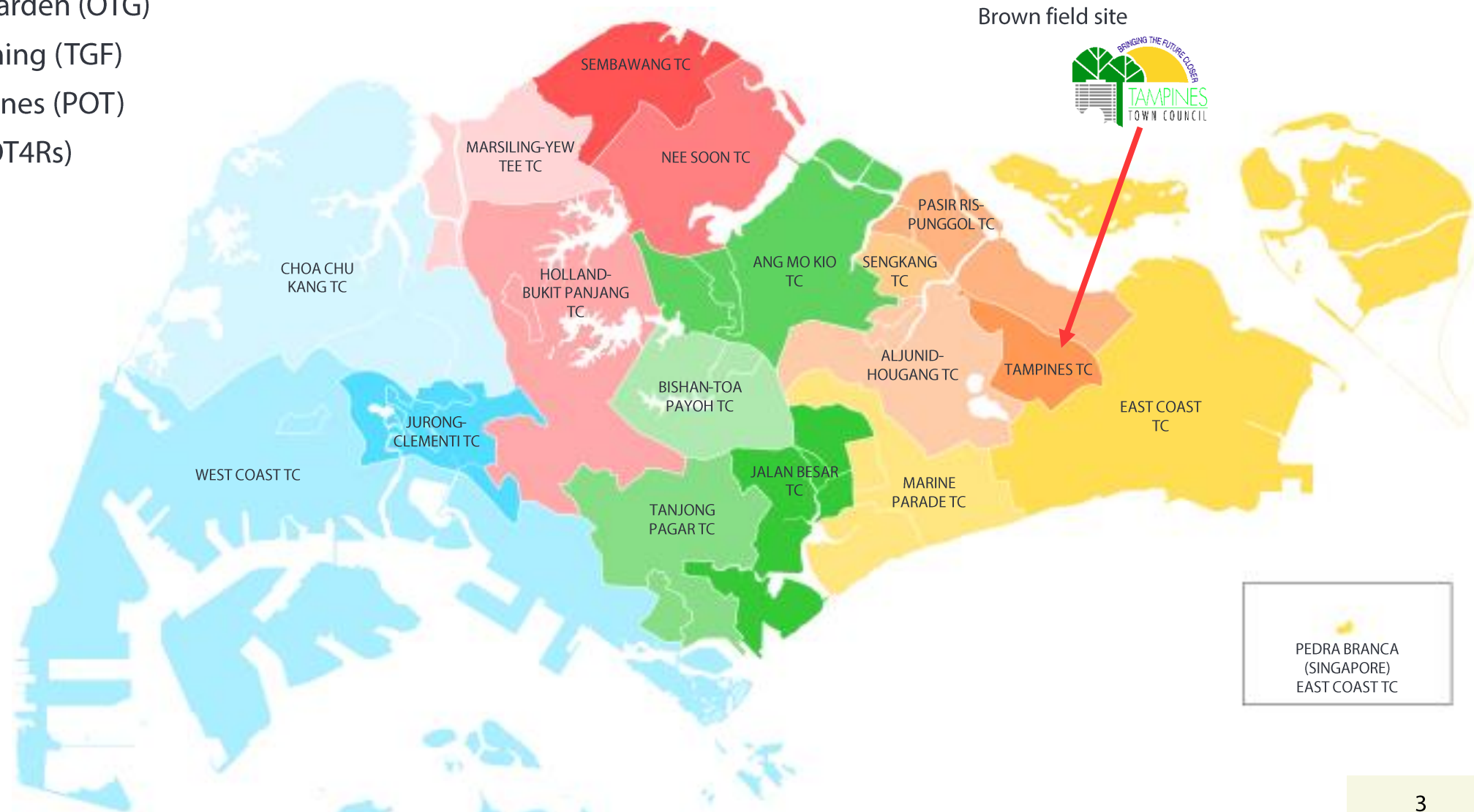
Mr Baey Yam Keng

Senior Parliamentary Secretary
Ministry of Transport
Advisor to Tampines GROs
Elected Member of Parliament for Tampines GRC

TOWN COUNCILS IN SINGAPORE

TO BECOMING A MODEL ECO-TOWN BY 2025

- Our Tampines in a Garden (OTG)
- Tampines Goes Farming (TGF)
- Powering Our Tampines (POT)
- Our Tampines 4Rs (OT4Rs)



FOCUS AREAS

Energy and Water



Community



Waste



Environment

Food



Smart



Greeneries



Internal

ECOSYSTEM PARTNERS

Government Linked Company

TEMASEK
FOUNDATION

TEMASEK
LIFESCIENCES
LABORATORY



EMSERVICES

Institute of Higher Learning



SUSS
SINGAPORE UNIVERSITY
OF SOCIAL SCIENCES



Temasek
POLYTECHNIC



Research Centre



CENTRE for
LiveableCities
SINGAPORE



Statutory Board



Ministry



Private Sector



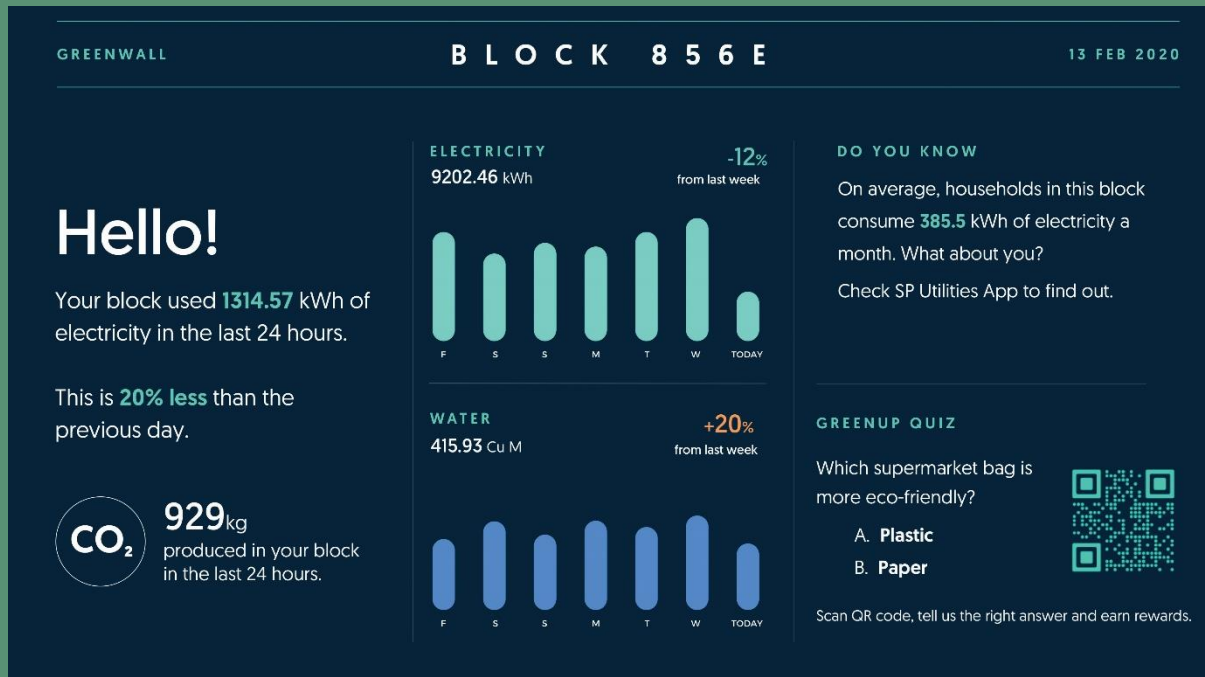
Hospital



ECO-BOARDS

GAMIFICATION TO REDUCE WATER AND ELECTRICITY USAGE

Partners	Implementation Dates	Remarks
MEWR SP Digital	November 2020 January 2021	878A, 496C, 270, 868A, 101 879A, 496D, 271, 869A, 103



AI-ENABLED, ECO-FRIENDLY SMART ENERGY SYSTEM

- To reduce energy consumption, Ministry of Sustainability and Environment (in partnership with Singapore Power and Temasek) will install Eco- Boards at our lift lobbies.
- These low-energy digital boards use smart meters to provide block-level information on water and energy use.
- Residents will become more aware of their consumption patterns to reduce wastage and the Town Council will manage resource usage more efficiently as a result.
- Singapore Power and PUB are in the midst of converting all electricity and water meters to smart for the whole town.

DIGITAL DISPLAY PANELS

DIGITAL WAY OF COMMUNICATION



1,607 Digital Display Panels

installed in the lifts across Tampines (except MSCP)

A joint venture company owned by Singapore Press Holdings and Focus Media China proposes the introduction of a “Smart Community Management Platform” in Tampines.

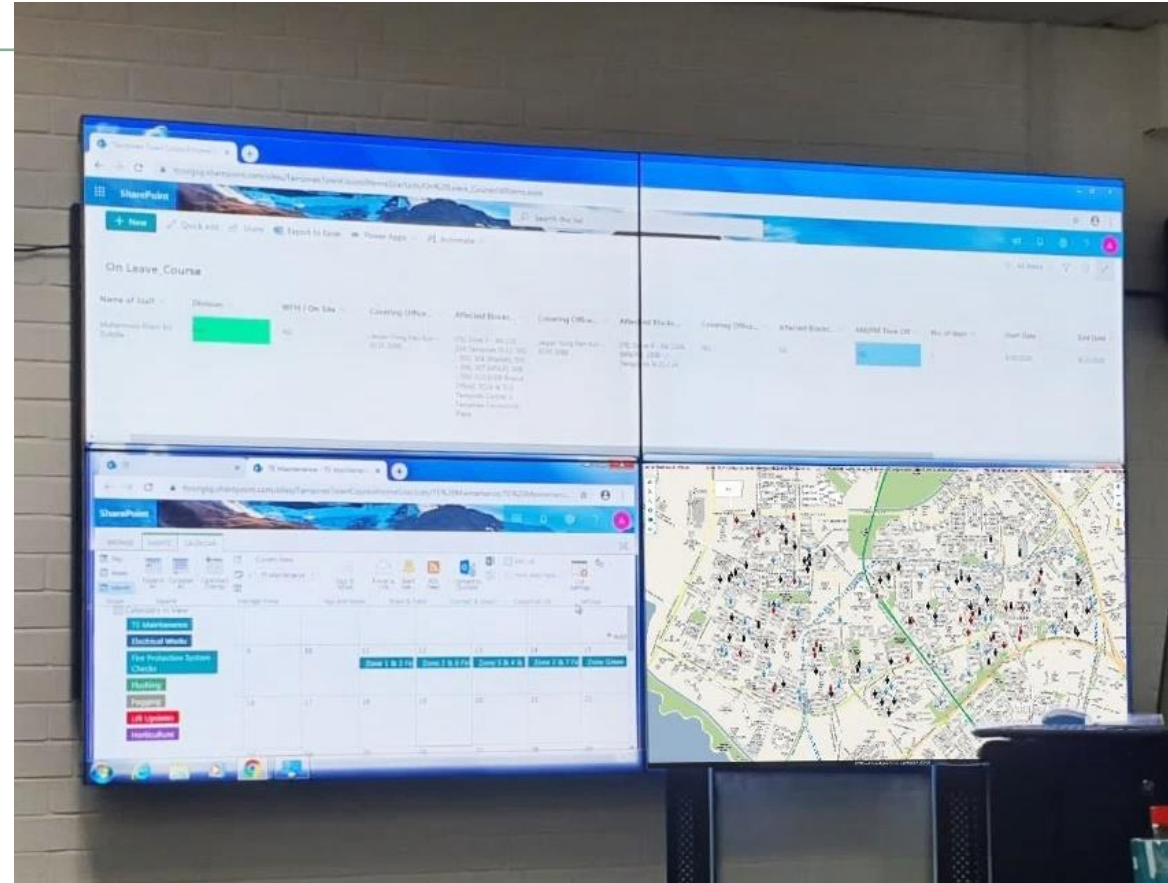
- Community content provided by the Town Council and scheduled for upload – via the mobile wireless internet.
- The platform shall adhere to the guidelines by HDB/MND with at least 70% of either screen size or screening time dedicated to community content.
- SPH will provide news content support to enhance the engagement appeal of this community platform.



OPERATION COMMAND CENTRE (OCC)

LIVE FEED OF INFORMATION OF THE TOWN

- Upgraded to a new IP-based communications platform.
- Combination of 4 panels;
- Screen size: 55 inches each
- The OCC will monitor the following:
 - Estate Monitoring System (EMS)
 - Daily staff movement
 - Maintenance Schedule
 - etc.



ESTATE MONITORING SYSTEM (EMS)

TRIANGULATION OF LOCATIONS OF CLEANING TEAM

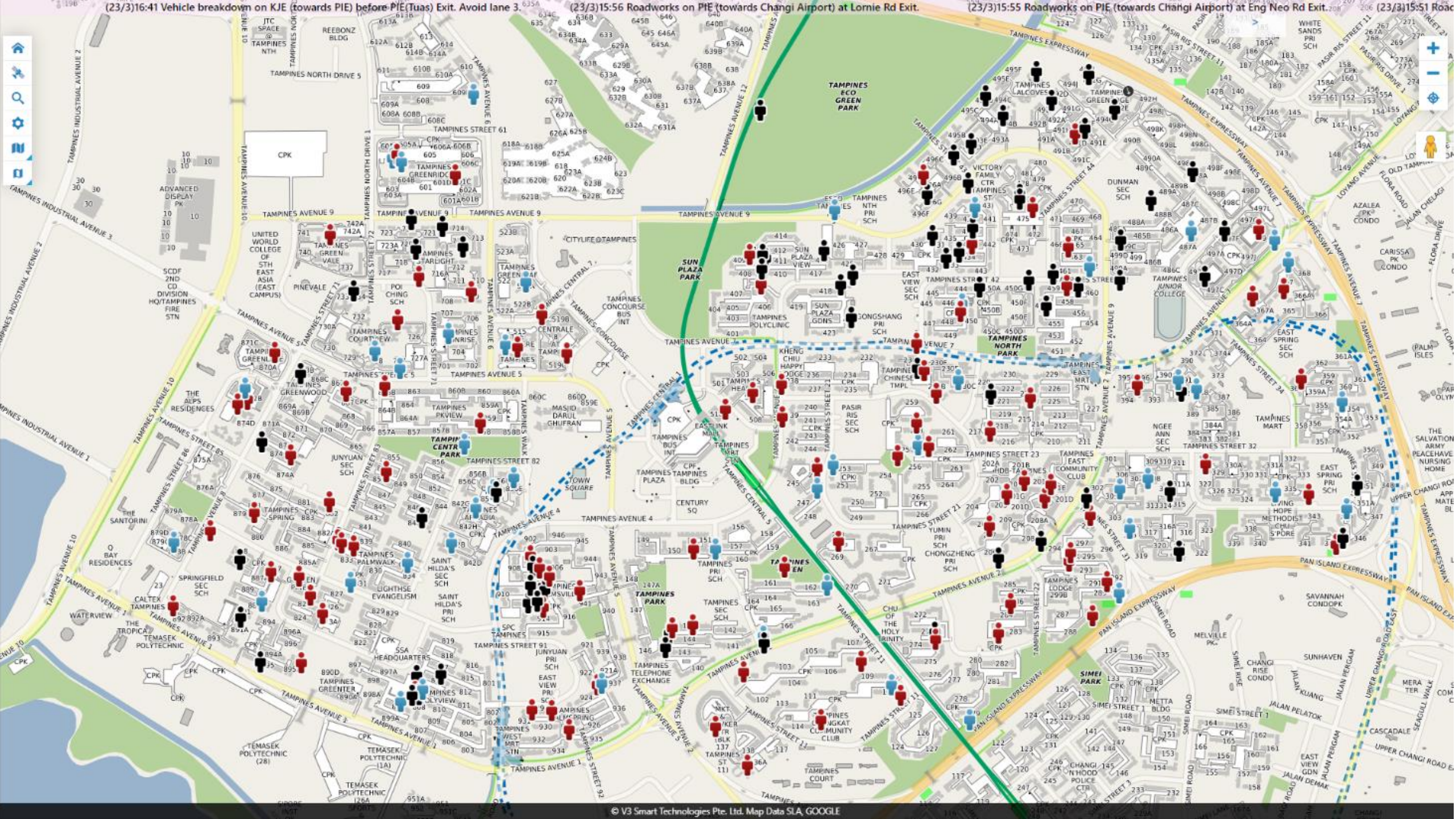
The EMS uses Vertical Positioning technology to capture information pertaining to cleaners' progress in assigned blocks.



BENEFITS:

- Job assignments made easier with Clusters Allocation, Staff Absence Updates and Location Work Scheduling for Accountability & Efficiency.
- Breakdown based on individual cleaners and their assigned blocks.
- Increased visibility over cleaners' movement and location
- Location Work Schedule – Filtering by Foreman, Cleaners and type of work for work status updates.

Group	Cluster	Block Complete	Total Blo	Percentage Complete
Changseng (Changkat)	Names	27	27	100%
Changseng (Changkat)		23	23	100%
Changseng (Changkat)		20	20	100%
Changseng (Changkat)		20	20	100%
Changseng (Changkat)		18	18	100%
Changseng (Changkat)		18	18	100%
Changseng (Changkat)		15	15	100%
Changseng (Changkat)		4	4	100%
Changseng (Changkat)		4	4	100%
Changseng (Changkat)		4	4	100%
Changseng (Changkat)		4	4	100%
Changseng (Changkat)		3	3	100%
Changseng (Changkat)		3	3	100%



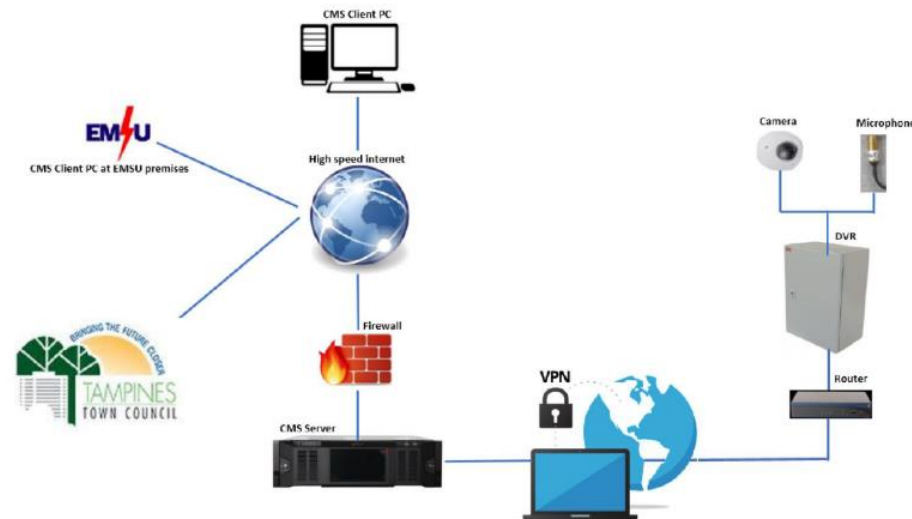
SMART LIFT SURVEILLANCE SYSTEM (LSS)

IP CAMERAS POWERED WITH DATA ANALYTICS



497 lifts installed with Smart LSS

- installed in the lifts across Tampines (except MSCP).
- 2 dome shaped IP cameras in each lift.
- Remaining lifts to progressively be replaced with Smart LSS (targeted replacement for 1,900 lifts).
- Smart LSS allows footages to be easily retrieved directly by Town Council.
- TC is informed of anomalies early through fault detection for set parameters, including items placed in lift or floor level misalignment, etc.
- Reduction in time required to manage issues and improve service quality.
- Next 5 years – 100 percent Smart LSS





PHOTOGRAMMETRY

3D MODELING FOR ASSET MGMT

Photogrammetry helps with the maintenance of buildings and allows asset tagging, which allows the possibility of live video feeds which could be used for understanding the crowd in the hawker centre.



USE OF ROBOTICS

ENHANCED PRODUCTIVITY TO SOLVE MANPOWER SHORTAGE



TC partnered with SUTD to incorporate robotics in future cleaning contracts.

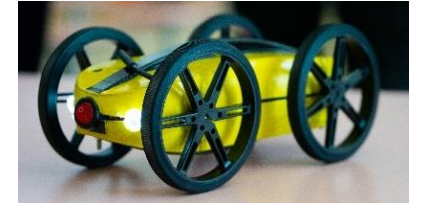
HTETRO

A shape shifting floor cleaning robot cleans corners, narrow and complex spaces



FALCON

Pest control on false ceilings, dispenses rodenticide and collects rodent droppings



EMU

Cleans lift buttons by using certified disinfectant solution



DRAGONFLY

Automatic mosquito surveillance and delivery of anti-mosquito agents

HORNBILL

Removes dirt from floor and sucks up waste water



RISK ASSESSMENT – ROBOTICS

HAZARD IDENTIFICATION				RISK EVALUATION				ADDITIONAL RISK CONTROL				
SN	WORK ACTIVITY	HAZARD	POSSIBLE ACCIDENT/ILL HEALTH	EXISTING RISK CONTROL (IF ANY)	EXISTING RISK			ADDITIONAL CONTROLS	RESIDENTIAL RISK			DUE DATE
					SEVERITY	LIKELIHOOD	RISK LEVEL		SEVERITY	LIKELIHOOD	RISK LEVEL	
1	Assembly of robot by using multiple tools	Sharp edges tools and trip while use the tools	Punctures and hands hit with hard objects	Put on PPE such as protective gloves, anti slip covered shoes and goggles; User must be trained	3	2	6	Nil	3	2	6	
2	Programming tasks (Use of computer/ laptop)	Visual Display Unit	Visual discomfort	Adjust the monitor brightness. Adopt good practice (e.g. close eyes momentarily, look at a distant object and blink frequently)	2	2	4	Nil	2	2	4	
3	Use of electrical equipment (computer, devices, electrical appliances)	Electrical	Electrical shock	Check equipment before use; Switch off electrical equipment after finish using; Use approved power sockets, plugs and cables and electrical appliances (with safety mark); Ensure there is no overloading of electrical appliances; No contact of electrical appliances with wet surfaces; Do not handle electrical appliances with wet hands.	3	2	6	Nil	3	2	6	
4	LiPo battery charging	Electrical	Electrical shock, fire sparks, fire outburst	Put on PPE such as protective gloves and goggles, Safe work procedures; Condition of the battery and charger are checked before use; LiPo batteries are charged by using a LiPo compatible charger; No unattended charging; No overnight charging. Check battery before use. Switch off charging station after finish charging; Ensure to keep batteries inside life-safe bag while charging. Use approved power sockets, plugs and cables and electrical appliances (with safety mark) Ensure there is no overloading of electrical appliances; No contact of electrical appliances with wet surfaces; Only SUTD trained personnel operate chargers; Label the start date of using on the batteries and keep track the number of charging for the batteries; Keep away from flammable/ combustible materials. Allocate a LiPo batteries charging station in the lab space	3	3	9	Nil	3	3	9	
	Dispose of LiPo batteries	Fire hazard	Fire sparks, fire outburst	Training; Put on PPE such as protective gloves and goggles; Safe work procedures; LiPo batteries are discharged before disposal	3	2	6	Nil	3	2	6	
5	Working in the test sites	Slip/trip/fall	Injury	Extension cords and wires are properly kept / taped down	3	2	6	Nil	3	2	6	
		Poor working environment (lighting level)	Eyestrain due to insufficient/wrong type of lighting	Adequate lighting lux levels	2	2	4	Nil	2	2	4	

RISK ASSESSMENT – ROBOTICS

HAZARD IDENTIFICATION				RISK EVALUATION				ADDITIONAL RISK CONTROL				
SN	WORK ACTIVITY	HAZARD	POSSIBLE ACCIDENT/ILL HEALTH	EXISTING RISK CONTROL (IF ANY)	EXISTING RISK			ADDITIONAL CONTROLS	RESIDENTIAL RISK			DUE DATE
					SEVERITY	LIKELIHOOD	RISK LEVEL		SEVERITY	LIKELIHOOD	RISK LEVEL	
5	Working in the test sites	Working alone	Danger of getting trapped if presence not known in the event of an emergency or if there is a threat to personal security	Remain contactable; Buddy system	5	1	5	Nil	5	1	5	
		Fire Emergency	Death/ injury due to smoke inhalation or burns	Fire evacuation drill; No obstruction to the fire exit and passage use for emergency evacuation; Equipped with fire extinguisher	5	1	5	Nil	5	1	5	
		Theft	Injury/ Death	Authorised access only; Look out for items left unattended/persons showing suspicious behaviours and characteristics/signs of radicalisation; Report suspicious activities or behaviour	5	1	5	Nil	5	1	5	
6	Testing robots	Electrical hazard	Injury	Training, Put on PPE such as protective gloves and goggles; Safe work procedures	3	2	6	Nil	3	2	6	
		Physical hazard	Struck by moving object, trip and Fall	Area is cordoned off	3	2	6	Nil	3	2	6	
7	Transportation of tools materials and robots	Struck by falling objects	foot injury	Trolley is used; Put on PPE such as protective gloves, shoes and goggles	3	2	6	Nil	3	2	6	
8	Manual handling of tools materials, robots, documents, boxes	Ergonomic	Suffer soft tissues, sprains, strains	Safe manual handling/lifting, Training; Put on PPE such as protective gloves and goggles	3	2	6	Nil	3	2	6	
9	Shouldering	Hot surface of solder tip	Burns	Training, Put on PPE such as protective gloves and goggles; Safe work procedures.	3	2	6	Nil	3	2	6	
		Inhalation of fumes	Harmful to health	Training, Put on PPE such as protective gloves and goggles; Safe work procedures. Ensure fume extractor used and placed near to workpiece	3	2	6	Nil	3	2	6	
10	Group Meetings	Biological hazard - Exposure to pathogens, bacteria and/or virus	COVID 19	Practice and follow social distance protocols and engage online meetings whenever possible	5	2	10	Nil	5	2	10	Comply with COVID-19 control measures & precautions

DRONE FAÇADE INSPECTION

USE OF AI & MI, THERMOGRAPHY TO DETECT BUILDING DEFECTS

- Using drone & high-resolution video camera to inspect façade.
- Using AI & ML, to detect façade defects. Through computer visioning, recognize defects by comparing photos with over 4 million images.
- Reduces risk of manual façade inspection.
- Increase productivity



RISK ASSESSMENT – DRONES

HAZARD IDENTIFICATION				RISK EVALUATION				ADDITIONAL RISK CONTROL					
S/N	WORK ACTIVITY	HAZARD	POSSIBLE ACCIDENT/ILL HEALTH & PERSONS AT RISK	EXISTING RISK CONTROL (IF ANY)	EXISTING RISK			ADDITIONAL CONTROLS	RESIDENTIAL RISK			IMPLEMENTATION DATE	DUE DATE
					SEVERITY	LIKELIHOOD	RISK LEVEL		SEVERITY	LIKELIHOOD	RISK LEVEL		
19	Airworthiness of UAS												
	Drone components falling off body	Drone parts not fully secured	Injury to persons/damage to property	Operator to ensure payload (camera) is properly attached and no loose parts in the drone.	4	2	8	Operator to ensure payload (camera) is properly attached and no loose parts in the drone	4	1	4	Pilot/Operator	All phases
	Drone falling on persons	Operator failure to keep line of sight to drone	Injury to persons/damage to property	Operator to maintain line of sight and not to fly the drone over any persons.	4	2	8	Operator to maintain line of sight and not to fly the drone over any persons	4	1	4	Pilot/Operator	Take-off mid-flight/ approach
	Signal loss	Signal Interference	Drone will fall causing injury to persons/damage to property	Drone pilot/operator will pull the tether cable.	4	2	8	Drone pilot/ operator will pull the tether cable	4	1	4	Pilot/Operator	Mid-flight
20	The Required Type of Operations												
	Drone blade cutting operator	Operator negligence	Injury to operator	Operator make sure drone is not turned on when doing pre-flight checks	4	2	8	Operator to make sure drone is not turned on when doing pre-flight checks	4	1	4	Pilot/Operator	Pre-flight
	Drone falling on passing vehicle	Operator failure to keep line of sight to drone	Injury to persons damage to property	Operator to not fly the drone over any vehicles	4	2	8	Operator to not fly the drone over the vehicles	4	1	4	Pilot/Operator	Take-off mid-flight approach
21	Area of Operations												
	Drone falling on persons	Pilot failure to warn persons nearby	Injury to persons/damage to property	Pilot to shout out when bringing drone back to land to clear the area of any persons	4	2	8	Pilot to shout out when bringing drone back to land to clear the area of any persons	4	1	4	Pilot	Take-off mid-flight approach
	High structures	Pilot failure to spot drone approaching structure	Damage to property	Safety personnel on-site to maintain line of sight to drone and voice out if drone is seen to be approaching structures	4	2	8	Safety personnel on-site to maintain line of sight to drone and voice out if drone is seen to be approaching structures	4	1	4	Safety personnel/ pilot/operator	All phases
	Lightning strike	Flight commencing with imminent storm	Drone short circuit and crash into property/persons, causing electrocution	Safety personnel on-site to check incoming weather and advice if storm is approaching and cancel flight or for storm to pass	4	2	8	Safety personnel on-site to check incoming weather and advice if storm is approaching and cancel flight or for storm to pass	4	1	4	Safety personnel/ pilot/operator	All phases
	Tight spaces	Take off/ landing site under shelter	Damage to property, injury to persons	Pilot and operator to conduct take-off and landing in open areas and ensure area is cleared of any personnel	4	2	8	Pilot and operator to conduct take-off and landing in open areas and ensure area is cleared of any personnel	4	1	4	Pilot/Operator	Take-off approach
	Loss of power	Sudden drop of battery levels	Injury to persons/damage to property	Pilot and operator to clear the area of any persons	4	2	8	Pilot and operator to clear the area of any persons	4	1	4	Pilot/Operator	Take-off mid-flight approach





Frank Ngoh, CFM, FMP

Add me





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