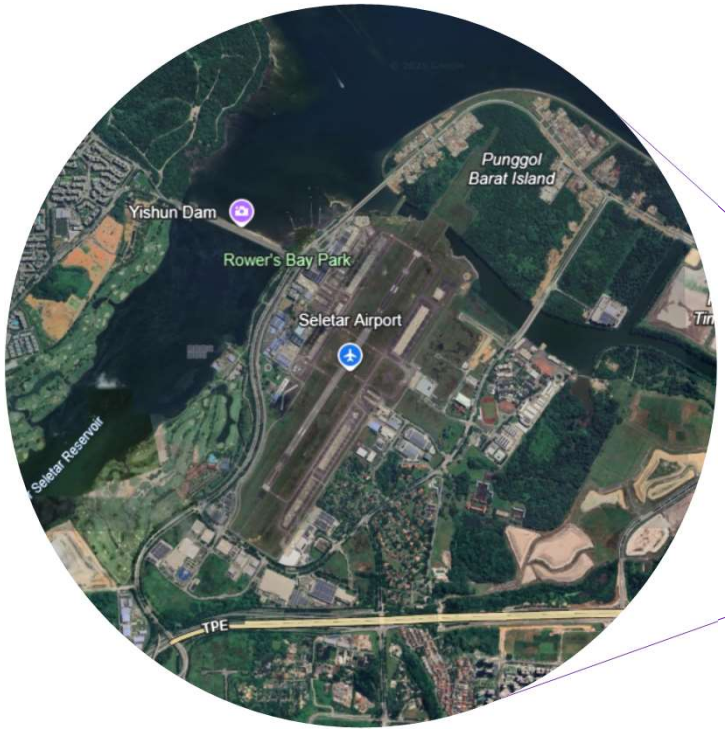
May 2025

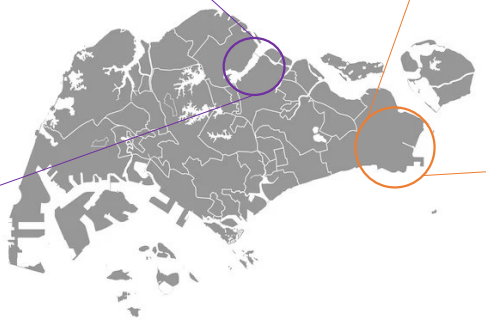
Wildlife Hazard Management at Changi and Seletar Airports

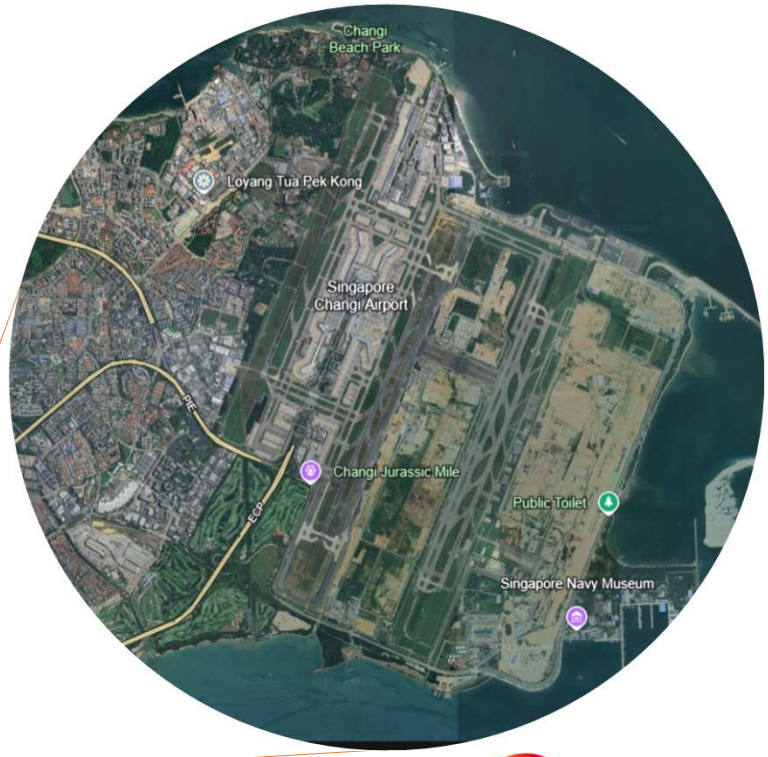
Overview of Changi and Seletar Airport

Overview of Changi and Seletar Airports

SELETAR AIRPORT







CHANGI
airport singapore

Overview


Understanding Wildlife Behaviour
Wildlife surveys
Wildlife sighting reports
Wildlife strike reports
Carcasses found
Staff Training
Changi Airport & Seletar Airport Wildlife Hazard Management
Wildlife Control Measures
Habitat management
Wildlife dispersals
Education Programme and Increasing Awareness
Photo by Wang Luan Keng

Wildlife Hazard Management Plan

- The goal of the Wildlife Hazard Management Programme (WHMP) for both airports is to provide a strategy to minimise risk for passengers and flight crews by reducing wildlife hazards and associated risks to aircraft and airport operations caused by wildlife activities within and in the vicinity of the airport.

- The objectives of the WHMP are to:
    a) Guide and facilitate compliance with all relevant airport legislation and regulations.
    b) Define roles, responsibilities, and procedures for managing wildlife risks.
    c) Define the measures in which wildlife hazards are determined and managed at Changi and Seletar Airport.
    d) Define safety performance indicators for wildlife hazard management.

Gathering Data

Understanding Wildlife Behaviour

	Type of wildlife data
Reportable data	Wildlife strikes
	Wildlife sightings
	Wildlife carcass FOD
Gathered data	Daily wildlife dispersals conducted by Duty Officers
	Wildlife population surveys conducted by external wildlife consultant
	Wildlife attractants (e.g. long grass, ponding)
	Habitat management efforts (e.g. chemical spraying, rodent management, insect treatment)
	Wildlife mitigation installations (e.g. anti-perching devices, irri-tapes)
	Wildlife prevention (e.g. perimeter fence, drain gratings, gates)

Gathering Data – Reporting of Wildlife Data

Understanding Wildlife Behaviour

- Reportable wildlife data includes wildlife strikes, wildlife sightings and wildlife carcass FODs
- They may originate from various sources listed below:

	Pilots	ATC	Duty Officers (Airside)	iFerret* (Automated FOD detection system)	Other ground staff
Wildlife Strikes	✓	✓	✓		
Wildlife sightings	✓	✓	✓	✓	✓
Wildlife carcass FOD	✓	✓	✓	✓	✓

* Only applicable to Changi Airport

iFerret Camera

Collecting, Recording and Analysing Wildlife Data – Wildlife Strikes

Understanding Wildlife Behaviour

Wildlife strike report

- Put up by Changi/Seletar Tower

WILDLIFE STRIKE REPORTING FORM
(This information is required for aviation safety)

OPERATOR or CALL SIGN			**AIRCRAFT TYPE** _____		
ENGINE TYPE			**AIRCRAFT REGISTRATION** _____		
DATE: Day ..... **Month** ..... **Year**			**TIME OF INCIDENT**	**(L)**	**(UTC)** .....
		Dawn	Day	Dusk	Night
AERODROME NAME			**RUNWAY USED** _____		
HEIGHT AGL..... **ft**	**SPEED (IAS)**..... **kt**		**APRX LOC** _____		
PHASE OF FLIGHT	☐ Unknown	☐ En-route	**SKY CONDITION**	☐ No Cloud	
	☐ Taxi	☐ Descend		☐ Some Cloud	
	☐ Take-off run	☐ Approach		☐ Overcast	
	☐ Climb	☐ Landing Roll			
			PRECIPITATION	☐ Fog	
				☐ Rain	
PART(S) OF AIRCRAFT					
	Struck	Damaged			
Radome	☐	☐	**BIRD SPECIES**		
Windshield	☐	☐			
Nose (excluding above)	☐	☐	**NUMBER OF BIRDS**	**Seen**	**Struck** .....
Engine No. 1	☐	☐			
Engine No. 2	☐	☐	**SIZE OF BIRD**	☐ Small ☐ Medium ☐ Large	
Engine No. 3	☐	☐			
Engine No. 4	☐	☐	**PILOT WARNED OF BIRDS**	Yes	No
Propeller	☐	☐			
Wing/Rotor	☐	☐	**LIGHTS USED:**		
Fuselage	☐	☐	Landing	☐ Yes	☐ No
Landing gear	☐	☐	Strobe Anti-Collision	☐ Yes	☐ No
Tail	☐	☐			
Lights	☐	☐			
Others (specify)	☐	☐			

EFFECT ON FLIGHT		**REMARKS**	
☐ None	☐ Precautionary landing	(Describe damage, injuries and other pertinent information)	
☐ Aborted take-off	☐ Engines shut down	_____	
☐ Others (specify)		_____	
NAME OF REPORTING OFFICER:	_____	ORGANISATION:	_____

When wildlife strike is reported,

Runway scanned for wildlife carcass(es) → If carcass found, duty officer is deployed to pick up carcass → Carcass kept in freezer and recorded → Carcass passed to wildlife consultant for identification

Collecting, Recording and Analysing Wildlife Data – Wildlife Sightings

Understanding Wildlife Behaviour

Wildlife sighting reports

- Pilots
- Control Tower
- Any ground staff

WILDLIFE STRIKE REPORTING FORM
(This information is required for aviation safety)

OPERATOR or CALL SIGN			**AIRCRAFT TYPE** _____		
ENGINE TYPE			**AIRCRAFT REGISTRATION** _____		
DATE: Day ..... **Month** ..... **Year**			**TIME OF INCIDENT**	**(L)**	**(UTC)** .....
		Dawn	Day	Dusk	Night
AERODROME NAME			**RUNWAY USED** _____		
HEIGHT AGL..... **ft**	**SPEED (IAS)**..... **kt**		**APRX LOC** _____		
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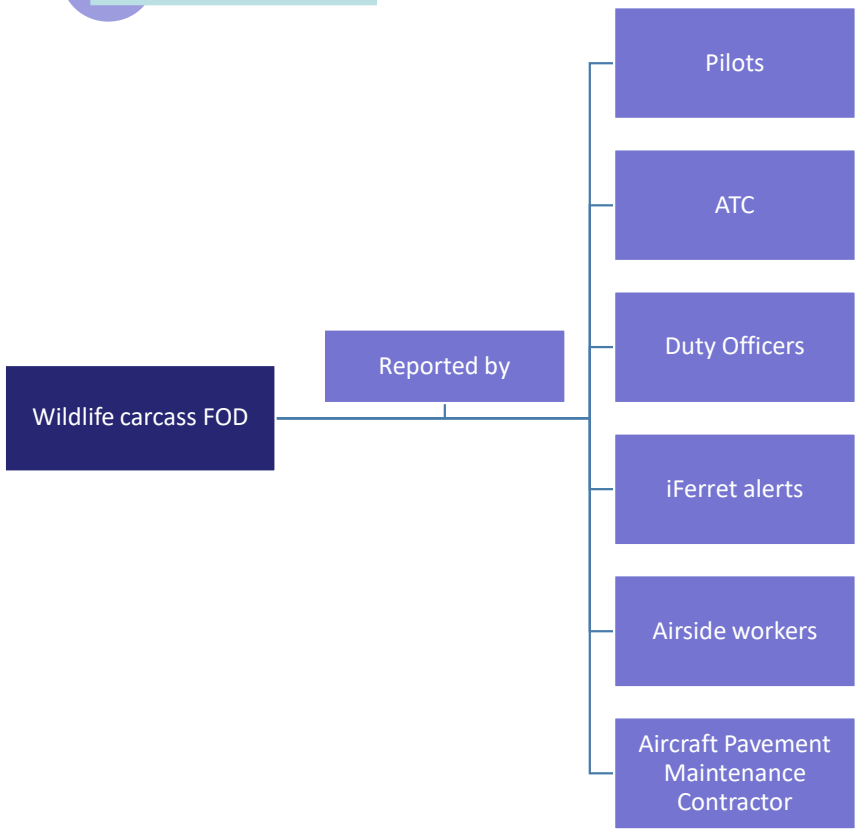
Fuselage	☐	☐	Landing	☐ Yes	☐ No
Landing gear	☐	☐	Strobe Anti-Collision	☐ Yes	☐ No
Tail	☐	☐			
Lights	☐	☐			
Others (specify)	☐	☐			

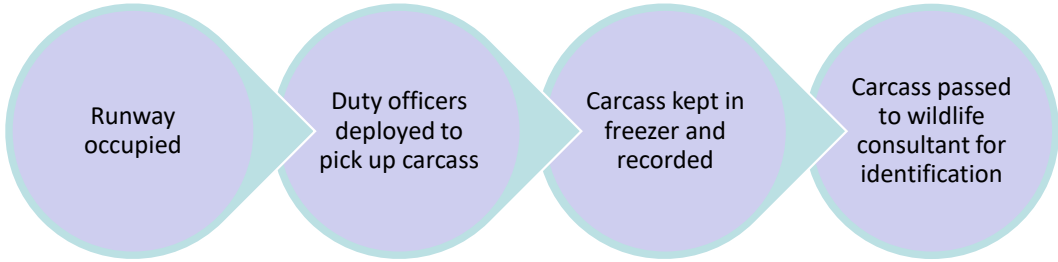
Collecting, Recording and Analysing Wildlife Data – Carcass FOD

Understanding Wildlife Behaviour

1 Reporting



2 Collect, record & analyse



Collecting, Recording and Analysing Wildlife Data – Wildlife Dispersals

Understanding Wildlife Behaviour

Data collected by Airside Duty Officers during patrols

	Wildlife Dispersal												Other wildlife attractants (e.g. water ponding, Shrubs, long grass, fruiting trees, feeding of wildlife, eating in airside):		
Staff full name	Date	Time	Weather	Runway in Ops (02L/02R/ 20L/02R)	Take off/ Landing/ Both	Location	Risk Zone	Number Sighted	Species Sighted	Birds Behaviour	Dispersal Tool	Behaviour of Birds after Dispersal/ Other Remarks	Location	Observation	Action Taken

Wildlife Risk Assessment

1. **Risk-based Approach**
   - Overall wildlife risk based on wildlife strike reports

2. **Species Risk Assessment**
   - Determine risk level of each species

Risk assessments are conducted monthly to determine risk level of wildlife hazards in the aerodrome and high-risk species to focus management efforts

High-risk Species

White-bellied Sea Eagle

Brahminy Kite

Intermediate Egret

Targeted Wildlife Mitigating Hazards Focusing on Food Source and Habitat Management

Wildlife Control Measures

TARGETED DISPERSAL AND REMOVAL

Improve understanding

- **Identify all carcasses and analyse** data and trends
- **Dissection** of raptor carcasses to study gut content
- **Monthly surveys** by consultants on all bird populations and **targeted surveys^** for raptors and egrets to understand their behaviour and movement

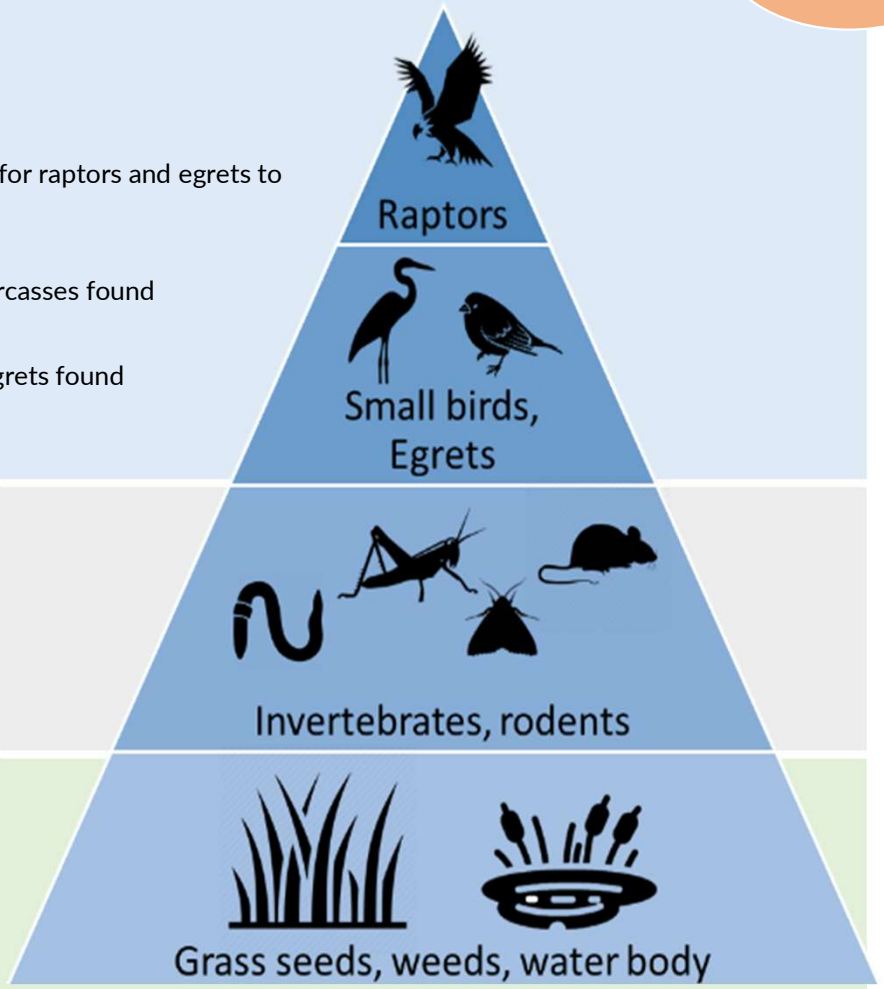
Dispersal and Removal

- Conduct **dispersals** and pyrotechnics^ strategically based on the location of carcasses found
- Active **nest removal**
- Installation of **irri-tapes*** strategically based on the location of abundance of Egrets found

HABITAT MANAGEMENT

- **Chemical spraying^** at both sides of turf by the runways
- **Survey of insects** using traps to understand food source
- **Rodent Management**

- **Turf Maintenance** and monthly inspection regime
- **De-weeding** at turf
- **Pumping out^** ponding areas
- Deter wildlife with **line-over-water^** and **netting^** at large water bodies



^ Applicable at Changi Airport only *Applicable at Seletar Airport only

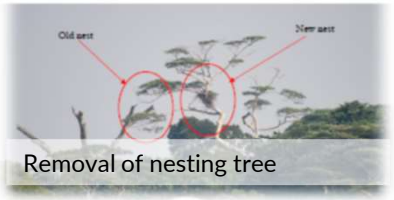
Habitat Management

Wildlife Control Measures

Turf management (grass cutting, deweeding)

Vegetation management

No fruit trees



Removal of nesting tree

Water bodies management

Line-over-water

Canal netting

Drainage cover

Control Food Sources

Chemical spraying

Rodent management

Exclusion Techniques

Bird spikes

Anti-perching devices

Bird proofing

Habitat Management – Non-avian Wildlife

Wildlife Control Measures

Additional targeted physical deterrence for non-avian wildlife

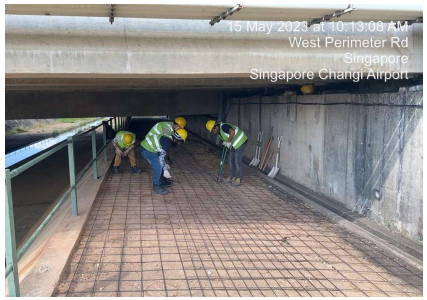

Otter Gate


Grating reduction


Grating over drain


Concrete blocks


Otter Holt Management



- Habitat management is one of the most effective and long-term management techniques to reduce wildlife hazards
- Efforts are focused on reducing or eliminating the wildlife attractants found in Changi Airport & Seletar Airport

Active Dispersals (Similar to other leading airports)

Wildlife Control Measures

- Focused dispersals on high-risk area and high-risk wildlife conducted during daylight hours
- All active runways are covered
- Various dispersal tools used to prevent wildlife habituation

Long Range Acoustic Device


Pyrotechnics


Aerolaser


Stockwhip


Flag


Propane cannon


Handheld propane cannon


Handheld fan

Other Measures

Wildlife Control Measures

Irri-tapes

- Deterrent measure targeted at Egrets to discourage gathering behaviour
- Nest removal to discourage nesting behaviour
- Decoys deployed to attract targeted species out of aerodrome

Nest removal

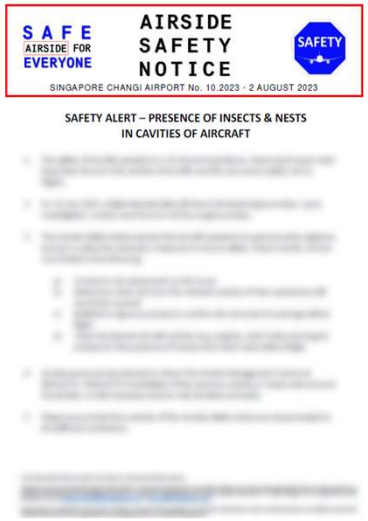
Decoys

Engagement with airside workers

Education Programme and Increasing Awareness

Airside workers play a significant role in reducing wildlife attractants in the aerodrome. Outreach to airside workers creates awareness on their role (e.g. no eating and drinking in the airside) and the importance of reporting wildlife hazards.
This is achieved through:

Airside Safety Induction Briefing



Airside Safety Notices

Awareness Posters

Proposed Nomination ★ Bronze

Outreach activities

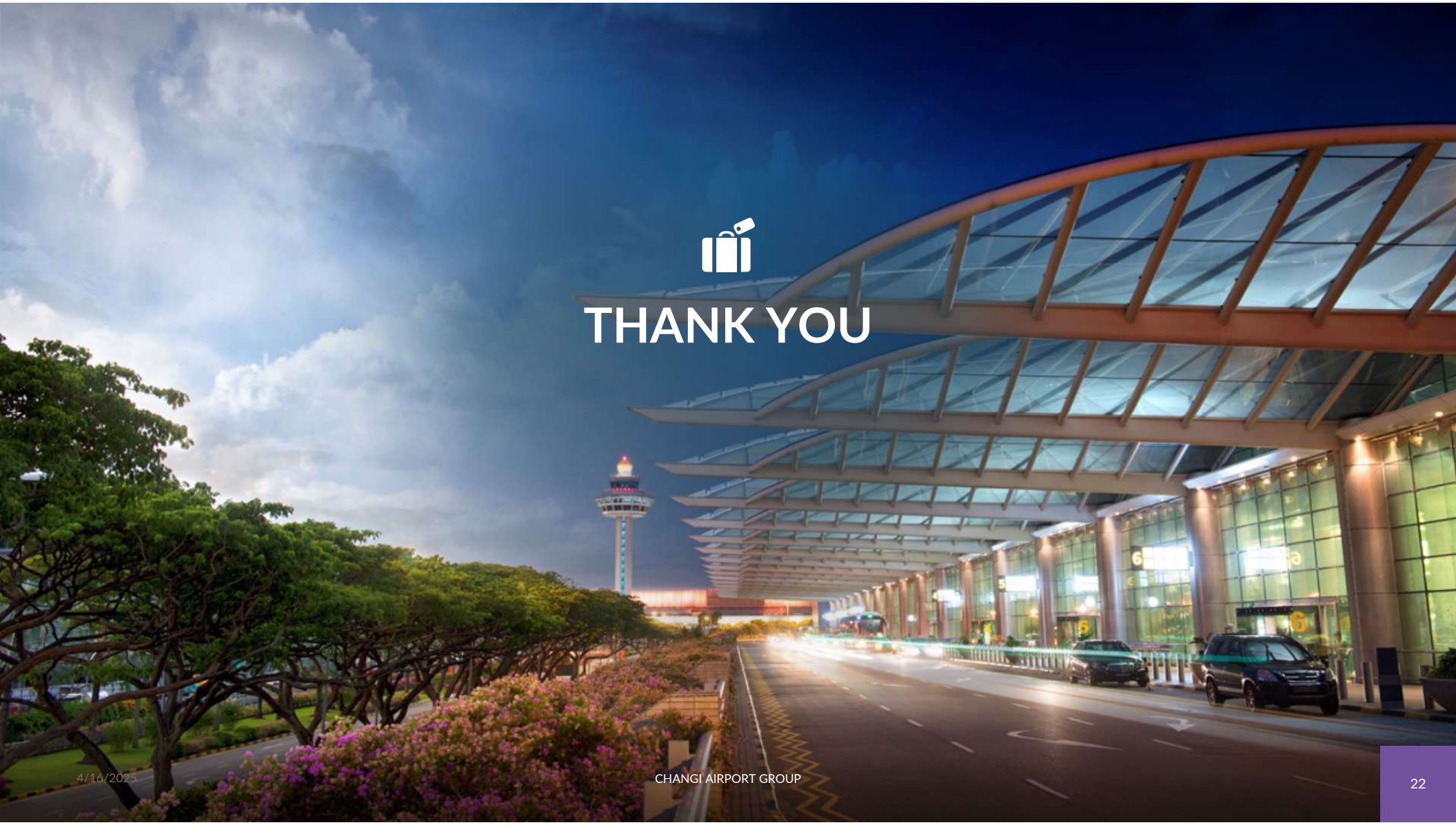
Staff Training

Staff Training

- Bird identification, behaviour and monitoring
- Data collection and reporting
- Wildlife dispersal techniques and equipment usage
- Identifying habitat attractants and management
- Animal handling
- Other airport knowledge training (eg. Safety Management Systems)

Wildlife Hazard Management is a team effort

- Wildlife Hazard Management involves multiple stakeholders spanning different teams within the airport. These teams include engineering, operations, safety & compliance, etc.
- Externally, close collaboration is required with airlines, regulators, wildlife agencies, local authorities, and airport contractors to address wildlife attractants and ensure compliance with aviation safety standards.
- To ensure that measures listed are up to date, the Wildlife Hazard Management Plan is reviewed and evaluated regularly


THANK YOU