

Head 168 — HONG KONG OBSERVATORY

Controlling officer: the Director of the Hong Kong Observatory will account for expenditure under this Head.

Estimate 2023–24 **\$446.8m**

Establishment ceiling 2023–24 (notional annual mid-point salary value) representing an estimated 367 non-directorate posts as at 31 March 2023 and as at 31 March 2024..... **\$248.6m**

In addition, there will be an estimated five directorate posts as at 31 March 2023 and as at 31 March 2024.

Controlling Officer’s Report

Programmes

Programme (1) Weather Services	This programme contributes to Policy Area 7: Public Safety (Secretary for Environment and Ecology).
Programme (2) Radiation Monitoring and Assessment	This programme contributes to Policy Area 9: Internal Security (Secretary for Security).
Programme (3) Time Standard and Geophysical Services	This programme contributes to Policy Area 7: Public Safety (Secretary for Environment and Ecology).

Detail

Programme (1): Weather Services

	2021–22 (Actual)	2022–23 (Original)	2022–23 (Revised)	2023–24 (Estimate)
Financial provision (\$m)	337.4	367.1	367.1 (—)	390.1 (+6.3%)
				(or +6.3% on 2022–23 Original)

Aim

2 The aim is to provide weather forecasts and issue warnings to the public, special users, the shipping community and aviation groups in order to reduce loss of life and damage to property, and minimise disruption to economic and social activities during hazardous weather.

Brief Description

3 The Central Forecasting Office and Airport Meteorological Office of the Hong Kong Observatory (HKO) are responsible for the preparation and issuance of weather information, forecasts and various warnings on hazardous weather to the public, special users, the shipping community and aviation groups. HKO also promotes public awareness of, and community preparedness for, natural disasters. The work involves:

- operating a network of mostly automated weather stations;
- carrying out real-time exchange of data with meteorological centres in the world;
- receiving meteorological satellite imageries, and operating weather radar systems and other meteorological instruments;
- analysing meteorological data and computing the future weather by numerical modelling;
- disseminating weather information by a diversity of means;
- issuing warnings and advisory messages on hazardous weather such as tropical cyclones, storm surges, rainstorms, landslips, flooding, thunderstorms, windshear, fire danger and extreme hot and cold conditions; and
- conducting public talks, interviews and training courses as well as producing TV weather programmes and educational materials on hazardous weather phenomena.

4 In 2022, HKO fulfilled its performance pledge of issuing at least one bulletin every hour of the day, disseminating 100 per cent of the bulletins within ten minutes after each hour, and attained a forecast accuracy (as verified by objective means) of 92 per cent. The mobile weather application “MyObservatory” and HKO website remained as popular channels for disseminating weather information to the public, recording about 161 billion total page views in the year.

5 To meet the needs of the public, HKO enhanced the provision of weather information in 2022–23 through:

- enhancing the Tropical Cyclone Warning service to cater for the combined effect of tropical cyclone and prolonged rainstorm;
- enhancing the accuracy of tropical cyclone track forecast;
- enhancing the Very Hot Weather Warning service to alert the general public of prolonged heat situations by delivering a related Special Weather Tips message via push notifications on the mobile weather application “MyObservatory”, as well as on HKO website;
- updating the mobile weather application “MyObservatory” with a more personalised home screen design to improve user experience;
- enhancing the “Weather Information for Fishermen” web portal with automatic sea-state forecasts and tropical cyclone tracks;
- enhancing the “Weather Website for Greater Bay Area (GBA)” with near real-time visibility reports, and forecast of over 600 grid points jointly provided by HKO, Guangdong Meteorological Service and the Macao Meteorological and Geophysical Bureau; and
- enhancing the “Automatic Regional Weather Forecast in Hong Kong & Pearl River Delta Region” service with observations and automatic weather forecasts at several newly added urban-scale meteorological monitoring stations.

6 HKO maintains a close surveillance of the weather at and around the Hong Kong International Airport (HKIA) and provides the aviation community with the weather information needed for its operations. In 2022–23, HKO implemented the aviation meteorological facilities required for the opening of the Third Runway in July 2022. In support of the operation of the new Integrated Airport Centre of the HKIA, HKO started dispatching Aeronautical Meteorological Advisers to provide weather briefings and consultation services at the Centre. In September 2022, HKO increased the frequency of issuance of the latest aerodrome forecast for HKIA from four to eight times a day. Throughout the year, HKO, as the Backup Centre of the Asian Aviation Meteorological Centre, took over the role of the Main Centre from Beijing for one week every quarter to issue hazardous weather forecasts and warnings to aviation users in the Asian region.

7 Other noteworthy activities for 2022–23 include:

- launching a new service to inform special users of the possibility of issuing Strong Wind Signal No.3 directly to replace the Strong Monsoon Signal;
- continuously enhancing the provision of weather information to the marine community and strengthening marine meteorological observation by deploying drifting buoys in the South China Sea;
- launching version two of the electronic flight bag weather mobile application “MyFlightWx” to provide enhanced inflight weather information to flight crews electronically and promoting its use to airlines operating from the HKIA;
- developing and launching a system for estimating the water depth on airport runways in real time to facilitate the issuance of the Runway Condition Report by the Airport Authority Hong Kong as required by the International Civil Aviation Organization;
- installing new equipment for detection of wake turbulence at the HKIA;
- organising educational events and outreach activities to engage the public, in particular young people and students, through the “Science in Public Service Campaign” and the “Community Weather Information Network”, which included workshops, scientific talks, online quizzes, on-site and virtual tours to HKO facilities;
- continuing efforts in educating the public on high-impact weather to enhance their awareness of and preparedness for natural disasters and the impacts of climate change;
- launching a series of six online videos to introduce the scientific knowledge and hazards of tropical cyclones to the public;
- launching a gallery on the HKO webpage to display photos of different weather phenomena collected via crowdsourcing;
- collecting and analysing cases which demonstrated the value of the rented Phased Array Doppler Weather Radar in detecting fast-changing and short-lived high impact weather systems such as hail and waterspout, and in enhancing HKO’s work in monitoring and predicting high impact weather;
- setting up the Backup South China Sea Tsunami Advisory Center (Hong Kong) as designated by the National Marine Environmental Forecasting Center in the Central Forecasting Office of HKO and undergoing trial operation;
- continuously enhancing the severe weather nowcasting software developed by HKO and, as a Regional Specialized Meteorological Centre (RSMC) for Nowcasting designated by the World Meteorological Organization, as well as sharing the software with and providing capacity building supports to overseas weather services;

Head 168 — HONG KONG OBSERVATORY

- signing an agreement with the Solomon Islands Meteorological Service to strengthen co-operation in aviation meteorological services and meteorological data exchange;
 - establishing a quality management system on operation and maintenance of the Tate’s Cairn Weather Radar; and
 - extending the quality management framework for critical information technology infrastructure services to cover network communication systems and data storage systems.
- 8 The key performance measures in respect of weather services are:

Targets

	Target	2021 (Actual)	2022 (Actual)	2023 (Plan)
forecasts perceived as accurate by the public (%)#	78	77	77	78
accurate public forecasts as verified by objective means (%)	88	93	92	90
accurate forecasts as assessed by ship captains (%)	96	98	96	96
accurate forecasts as assessed by airline operators (%)	96	99	99	97
hourly local weather reports disseminated within the first ten minutes of each hour (%)	99	100	100	99

Indicators

	2021 (Actual)	2022 (Actual)	2023 (Estimate)
calls answered by the Dial-a-Weather system (million)#	5.1	4.3	4.0
telephone enquiries answered manually#	12 079	12 895	10 000
visits to the HKO website (billion)^	142	161	150
companies and organisations subscribing to special weather and warning services	90	85	86
total revenue from the above subscribers (\$m)	0.6	0.7	0.7
media interviews and public lectures/talks on weather#	650Δ	740Δ	700
meteorological documents for flights departing Hong Kong	74 000	71 000@	75 000
visits to the aviation weather information system (million)	232.2	265.0δ	280.0

The actual figures may vary depending on whether there are more weather changes of concern to the public in that particular year.

^ Figures measured in page views refer to the number of access to the HKO website which includes the mobile website, the Weather Wizard and the mobile application “MyObservatory”. The actual figures may vary depending on whether there are more weather changes of concern to the public in that particular year.

Δ Some of the talks were conducted through online channels to avoid mass gatherings due to the COVID-19 pandemic.

@ Figures dropped as compared to 2021 owing to reduction in the number of flights in 2022.

δ The aviation weather information system is gaining popularity despite a drop in the number of flights in 2022.

Matters Requiring Special Attention in 2023–24

- 9 During 2023–24, HKO will:
- continue to provide weather forecasts, regional weather services and extended weather outlook, including multi-hazard and impact-based forecasts;
 - continue to develop and enhance nowcasting and forecasting services on high-impact weather for the public and special users;
 - continue to strengthen efforts in public communication as well as education, outreach and social media services to enhance public awareness of and preparedness for natural disasters and impacts of climate change;
 - conduct a series of publicity activities for the 140th anniversary of HKO to promote HKO’s services;
 - continue to implement the aviation meteorological facilities in support of the Three-Runway System project for the HKIA;
 - procure and install more wake turbulence detection equipment at the HKIA to support its future development;

- continue to implement the project for replacing the Tai Mo Shan storm-detecting weather radar in support of HKO’s weather forecast operation;
- continue to enrich the content of the mobile weather application “MyObservatory” and HKO website;
- continue to enhance the automatic weather station network for providing more weather information;
- continue to enhance urban-scale weather monitoring by expanding the coverage of the microclimate station network;
- take forward planning efforts for establishment of the supersite for the GBA Meteorological Monitoring and Warning Centre (Hong Kong) under the Meteorological Development Plan for the Guangdong-Hong Kong-Macao GBA (2020–2035) to provide regional meteorological monitoring and forecasting services, with a view to strengthening collaboration in combatting climate change in the GBA;
- continue to enhance marine meteorological observations through the deployment of drifting buoys;
- continue to enhance the nowcast products in the web portal of RSMC for Nowcasting;
- continue to enrich the “Earth Weather” webpage on HKO website with more weather information including sea current forecast;
- implement the numerical weather prediction models on the high performance computer system in support of weather forecast operation;
- develop a cloud-based platform for managing and generating meteorological data and products;
- continue to enhance the quality management of the operation and maintenance of the Tate’s Cairn Weather Radar with a view to obtaining the International Organization for Standardization (ISO) 9001 certification; and
- continue to strengthen the quality management of critical information technology infrastructure services as required for ISO 20000 certification.

Programme (2): Radiation Monitoring and Assessment

	2021–22 (Actual)	2022–23 (Original)	2022–23 (Revised)	2023–24 (Estimate)
Financial provision (\$m)	35.6	32.1	32.1 (—)	37.6 (+17.1%)
				(or +17.1% on 2022–23 Original)

Aim

10 The aim is to provide information on environmental radiation levels in Hong Kong and advise government departments on the protective action that may be necessary during nuclear emergencies.

Brief Description

11 HKO monitors ambient radiation levels in Hong Kong and conducts radiological measurements on air, soil, water and food samples. In the event of a nuclear emergency, HKO will notify and advise government departments on the possible consequences in Hong Kong and recommend protective action. HKO organises training and exercises on radiation monitoring, assessment and protection for other government departments involved in the Hong Kong contingency plan for nuclear emergencies. The work involves:

- operating a network of radiation monitoring stations, an aerial radiation monitoring system, two radiological survey vehicles, a radiation laboratory and an emergency radiation data management system;
- keeping abreast of the latest development on the methodology for nuclear accident consequence assessment; and
- planning and participating in exercises and drills in response to nuclear emergencies.

12 In 2022–23, all radiation monitoring and assessment work in this programme was carried out satisfactorily. All equipment was maintained in a state of readiness. Exercises, drills and training on radiation monitoring, assessment and protection were conducted. New model of high pressure ionization chambers of the Radiation Monitoring Network was operating smoothly. The scope of ISO 9001 certification for ambient radiation monitoring service was extended to include measurements conducted by radiological survey vehicles. A new emergency communication computer system was implemented to support nuclear emergency operations. An inverse modelling system for nuclear accident consequence assessment was developed. Outreach activities such as public and school talks were conducted to enhance public education. The school community ambient radiation measurement programme named “Gamma-Go” continued to promote students’ understanding of radiation through STEM activities and award scheme. An e-book on radiation was launched to promote the public’s understanding of radiation and raise the awareness of emergency preparedness and response.

Head 168 — HONG KONG OBSERVATORY

13 The key performance measures in respect of radiation monitoring and assessment are:

Target

	Target	2021 (Actual)	2022 (Actual)	2023 (Plan)
data availability of radiation monitoring network (%)	99.0	99.9	99.9	99.6

Indicators

	2021 (Actual)	2022 (Actual)	2023 (Estimate)
exercises and drills	21	23	22
visits to HKO's webpage on radiation ϕ	9 473 006	4 343 476	5 000 000

ϕ The actual figures may vary from year to year depending on whether there are particular issues of concern to the public.

Matters Requiring Special Attention in 2023–24

14 During 2023–24, HKO will continue to:

- implement the agreed arrangements between Hong Kong and Guangdong on radiation monitoring and assessment;
- conduct drills and exercises on emergency response in conjunction with other government departments as well as the relevant Guangdong counterparts;
- organise training on radiation monitoring and assessment;
- take forward the enhancement of radiation monitoring and assessment facilities; and
- further promote the Gamma-Go programme to sustain school community education on radiation.

Programme (3): Time Standard and Geophysical Services

	2021–22 (Actual)	2022–23 (Original)	2022–23 (Revised)	2023–24 (Estimate)
Financial provision (\$m)	20.8	19.6	19.6 (—)	19.1 (–2.6%)
				(or –2.6% on 2022–23 Original)

Aim

15 The aim is to maintain the Hong Kong time standard and provide geophysical, oceanographic, astronomical and climatological information to the public.

Brief Description

16 HKO maintains the Hong Kong time standard, provides time signals for the public and contributes to the International Bureau of Weights and Measures for the determination of the universal standard time. It provides geophysical, oceanographic, astronomical, climatological information, climate projection, seasonal and annual forecast to meet the requirements for planning, engineering design and environmental impact assessments. It monitors earthquakes and the sea level and releases related information to the public, including the operation of the tsunami warning system. It also keeps abreast of research and development on international issues such as global climate change and advises the public and government bureaux/departments on the likely implications. The work involves:

- maintaining a network of caesium beam atomic clocks as the Hong Kong time standard and providing time signals for radio broadcasts, automatic telephone answering service and synchronisation of clocks via the Internet;
- operating seismological, tide and sea level monitoring networks and conducting related analyses;
- carrying out real-time exchange of seismic data with overseas centres and disseminating earthquake information by various means;
- compiling climatological and other related data;

Head 168 — HONG KONG OBSERVATORY

- conducting studies on climate change in Hong Kong and promoting public understanding; and
 - providing updates on the effects of El Niño, La Niña and other longer-term atmospheric phenomena on Hong Kong.
- 17** In 2022–23, the objectives and targets of this programme were generally met through the following:
- providing scientific support to studies by relevant government bureaux/departments on the mitigation, adaptation and resilience-building measures required in combatting climate change and its impacts including extreme weather events;
 - monitoring climate change-related scientific studies, and providing the latest assessment of climate change and its impacts, as well as enhanced and updated climate projections to support policy making and action planning of relevant government bureaux/departments;
 - promoting public understanding and awareness of climate change and its impacts through conducting school talks and climate science webinars, producing educational videos, and publishing articles and latest international research findings on global climate change on the HKO website;
 - launching educational videos on the key findings of the Sixth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC);
 - updating climate projections for Hong Kong based on global climate model data of the IPCC;
 - enhancing climate forecasting services by providing seasonal forecast for the next three months on a monthly basis; and
 - strengthening the resilience of the tide gauge stations through additional sensors and support facilities.
- 18** The key performance measures in respect of time standard and geophysical services are:

Targets

	Target	2021 (Actual)	2022 (Actual)	2023 (Plan)
time standard accuracy (microseconds per day)	0.01	0.01	0.01	0.01
geophysical, meteorological and oceanographic data capture rate (%)	99	100	100	99
climatological information (% of written requests responded to within ten working days)	99	100	100	99

Indicators

	2021 (Actual)	2022 (Actual)	2023 (Estimate)
visits to HKO's Internet time service (million).....	91 189	100 000	100 000
requests for geophysical, climatological and oceanographic information and advice	642	646	650

Matters Requiring Special Attention in 2023–24

- 19** During 2023–24, HKO will continue to:
- undertake and support monitoring and assessment of earthquake, tsunami risk and sea level in the region;
 - enhance its earthquake monitoring and tsunami warning capability;
 - strengthen the tide gauge network to better cope with extreme sea level conditions;
 - monitor and study climate change issues, as well as provide relevant government bureaux/departments with latest information and assessment of climate change and its impacts to support their studies;
 - engage various stakeholders to promote the effective use of climate data in support of the emerging needs of different sectors and government bureaux/departments; and
 - conduct outreach activities to promote public understanding of measures required in combatting climate change.

Head 168 — HONG KONG OBSERVATORY

ANALYSIS OF FINANCIAL PROVISION

	2021–22 (Actual) (\$m)	2022–23 (Original) (\$m)	2022–23 (Revised) (\$m)	2023–24 (Estimate) (\$m)
Programme				
(1) Weather Services	337.4	367.1	367.1	390.1
(2) Radiation Monitoring and Assessment..	35.6	32.1	32.1	37.6
(3) Time Standard and Geophysical Services.....	20.8	19.6	19.6	19.1
	393.8	418.8	418.8 (—)	446.8 (+6.7%)
				(or +6.7% on 2022–23 Original)

Analysis of Financial and Staffing Provision

Programme (1)

Provision for 2023–24 is \$23.0 million (6.3%) higher than the revised estimate for 2022–23. This is mainly due to the increased requirement for operating expenses.

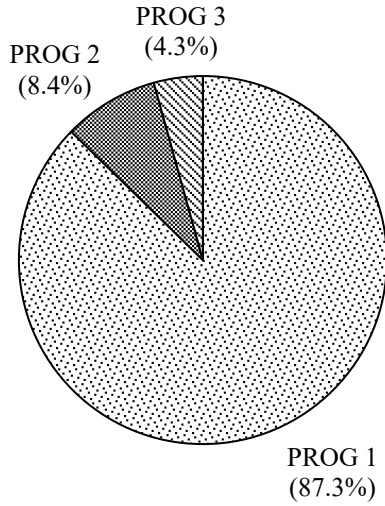
Programme (2)

Provision for 2023–24 is \$5.5 million (17.1%) higher than the revised estimate for 2022–23. This is mainly due to the increased requirement for capital expenditure.

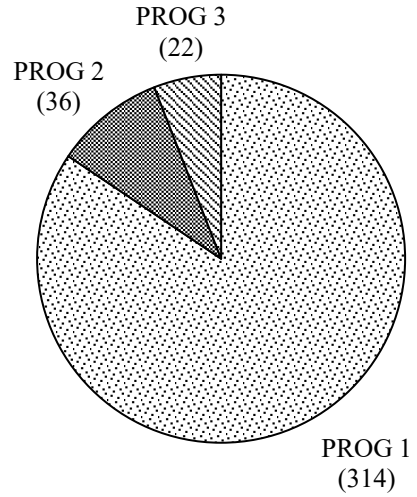
Programme (3)

Provision for 2023–24 is \$0.5 million (2.6%) lower than the revised estimate for 2022–23. This is mainly due to the decreased requirement for capital expenditure.

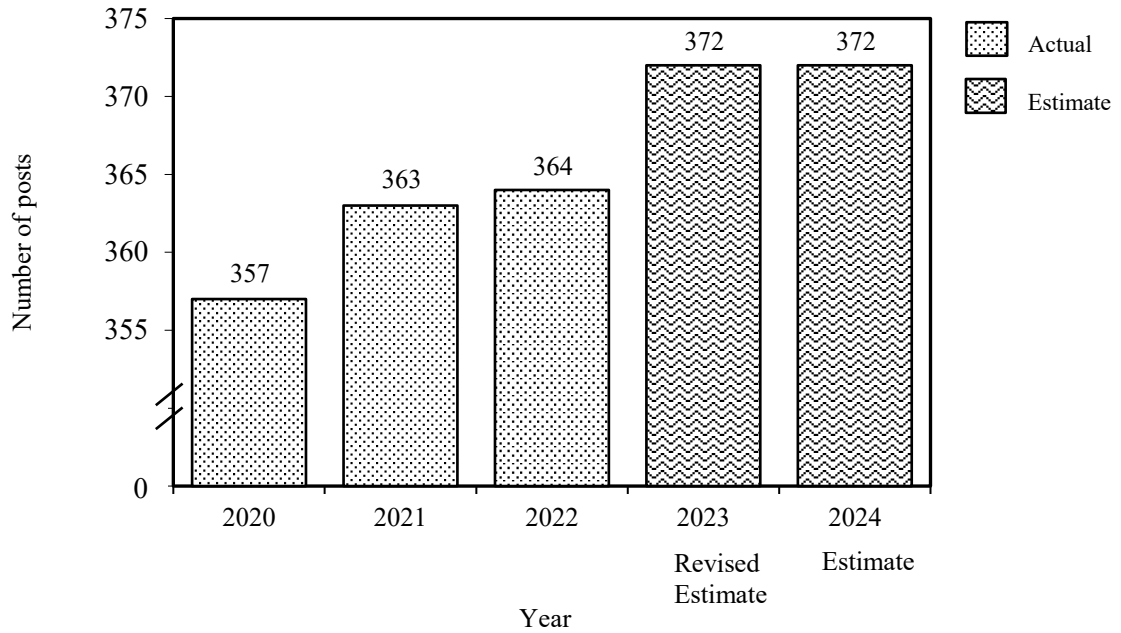
Allocation of provision to programmes (2023-24)



Staff by programme (as at 31 March 2024)



Changes in the size of the establishment (as at 31 March)



Head 168 — HONG KONG OBSERVATORY

Sub-head (Code)	Actual expenditure 2021–22	Approved estimate 2022–23	Revised estimate 2022–23	Estimate 2023–24	
	\$'000	\$'000	\$'000	\$'000	
Operating Account					
Recurrent					
000	Operational expenses	372,274	401,291	401,291	422,996
	Total, Recurrent.....	372,274	401,291	401,291	422,996
	Total, Operating Account	372,274	401,291	401,291	422,996
Capital Account					
Plant, Equipment and Works					
661	Minor plant, vehicles and equipment (block vote).....	21,537	17,515	17,515	23,810
	Total, Plant, Equipment and Works.....	21,537	17,515	17,515	23,810
	Total, Capital Account.....	21,537	17,515	17,515	23,810
	Total Expenditure	393,811	418,806	418,806	446,806

Head 168 — HONG KONG OBSERVATORY

Details of Expenditure by Subhead

The estimate of the amount required in 2023–24 for the salaries and expenses of the Hong Kong Observatory is \$446,806,000. This represents an increase of \$28 million over the revised estimate for 2022–23 and \$52,995,000 over the actual expenditure in 2021–22.

Operating Account

Recurrent

2 Provision of \$422,996,000 under *Subhead 000 Operational expenses* is for the salaries, allowances and other operating expenses of the Hong Kong Observatory.

3 The establishment as at 31 March 2023 will be 372 posts. No change in establishment is expected in 2023–24. Subject to certain conditions, the controlling officer may under delegated power create or delete non-directorate posts during 2023–24, but the notional annual mid-point salary value of all such posts must not exceed \$248,577,000.

4 An analysis of the financial provision under *Subhead 000 Operational expenses* is as follows:

	2021–22 (Actual) (\$'000)	2022–23 (Original) (\$'000)	2022–23 (Revised) (\$'000)	2023–24 (Estimate) (\$'000)
Personal Emoluments				
- Salaries	232,242	257,789	251,691	264,439
- Allowances	3,004	4,555	4,555	4,555
- Job-related allowances.....	823	652	1,431	1,382
Personnel Related Expenses				
- Mandatory Provident Fund contribution	1,412	1,128	1,454	1,212
- Civil Service Provident Fund contribution	11,229	13,842	13,834	17,641
Departmental Expenses				
- General departmental expenses	123,449	123,209	128,210	133,651
Other Charges				
- World Meteorological Organization.....	115	116	116	116
	372,274	401,291	401,291	422,996

Capital Account

Plant, Equipment and Works

5 Provision of \$23,810,000 under *Subhead 661 Minor plant, vehicles and equipment (block vote)* represents an increase of \$6,295,000 (35.9%) over the revised estimate for 2022–23. This is mainly due to the increased requirement for capital expenditure.