

Land, Infrastructure, Housing and Public Utilities

Land and Urban Construction Bureau

The Land and Urban Construction Bureau is a government department under the supervision of the Secretary for Transport and Public Works, responsible for studying, planning, launching and implementing policies related to urban planning, land management, utilisation and development. The bureau is also responsible for issuing licences and supervising civil engineering projects, as well as monitoring the safety of electrical installations and mechanical equipment in buildings.

According to By-law 14/2022, the Land and Urban Construction Bureau officially commenced operation on 1 April 2022. This followed restructuring in accordance with the by-law, during which the original functions of the former Lands, Public Works and Transport Bureau related to public construction and infrastructure were transferred to the Public Works Bureau. In addition, a new department for mechanical and electrical facilities was added, resulting in four major portfolios together with the original Urban Planning Department, Land Management Department, and Urban Development Department, to promote urban construction works such as urban planning, land management, and the approval and supervision of private construction projects.

Macao Urban Planning

Master Plan

By-law 7/2022, on the approval of Macao's Urban Development Master Plan (2020-2040), came into effect in 2022 and presents key planning concepts for various areas, including land use, spatial layout, residential land, industry, transportation, environmental protection, public facilities, infrastructure, cultural heritage, urban landscape, urban renewal, and disaster prevention, thus outlining Macao's future urban layout and development blueprint.

Detailed Planning

Since the announcement of the By-law on Macao's Urban Development Master Plan (2020-2040), the Macao Government has commenced detailed planning work for each planning zone in phases, covering Eastern District-2, Outer Harbour District-1, Outer Harbour District-2, and Northern District-1.

Detailed Planning for Eastern District-2

The draft of the Detailed Planning for Eastern District-2 underwent promotion, display and public consultation for a period of 60 days, from 7 October to 5 December 2022. The plan proposes medium and long-term objectives to create more favourable conditions for living in the community – focusing on building public housing, improving facilities that support livelihoods, and supporting the development of small and medium-sized enterprises. It aims to create a landmark urban waterfront in the district, which can complement the functions of the existing urban areas. The construction of iconic public facilities, green spaces, open public areas, and a public transportation-oriented

development (TOD) core will form a comprehensive commercial and service node, providing a beautiful living space for Macao residents.

Detailed Planning for Outer Harbour District-1 and Outer Harbour District-2

The contract for the detailed planning for Outer Harbour District-1 and Outer Harbour District-2 was awarded in September 2022 and signed in November 2022, allowing the first phase of the project to commence. This includes an analysis of the current situation, urban design concepts, development of a planning proposal, and a preliminary impact assessment.

Detailed Planning for Northern District-1

The contract for the detailed planning for Northern District-1 was awarded in December 2022, allowing the first phase of the project to commence. This includes an analysis of the current situation, urban design concepts, development of a planning proposal, and a preliminary impact assessment.

Project Plans

By-law No. 6/2022 on Land Classification and Uses came into effect in February 2022. The regulation subdivides land use categories and sets criteria for land classification and use that must be followed in the process of urban planning compilation, review and modification, to support detailed planning work.

Planning Condition Drafts

Urban planning conditions for districts lacking detailed planning are being compiled by the Land and Urban Construction Bureau in accordance with the Urban Planning Law and the Rules for the Implementation of the Urban Planning Law. During 2022, 49 sets of planning conditions for urbanisation management were issued, considerably lower than the figure of 95 in 2021.

Construction Companies and Contractors

The Land and Urban Construction Bureau is responsible for handling the registration or renewal of registration for individual business owners and businesses (involved in construction implementation), contractors (construction implementation), companies or individual business owners (urban construction and urban planning), companies (gas), and technicians (urban construction and urban planning). The bureau is also responsible for regularly updating information and assessing the statuses of related industries.

As at the end of 2022, a total of 1,518 individual business owners or companies (construction implementation), contractors (construction implementation), companies or individual business owners (urban construction and urban planning) and companies (gas) were legally registered or had their registration renewed at the Land and Urban Construction Bureau, with details as follows:

Category		New registration	Renewed registration	Total
Contractors (construction implementation)		27	165	192
Individual business owners or companies (construction implementation)	Construction implementation	164	920	1,084
	Fire	3	75	78
	Sub-total	167	995	1,162
Companies or individual business owners (urban construction and urban planning)	Plan drafting Construction supervision Construction monitoring	11	102	113
	Fire	0	9	9
	Sub-total	11	111	122
Companies (gas)		11	31	42
Total		216	1,302	1,518

According to Law No. 14/2021 – Legal System on Urban Construction, which came into effect on 17 August 2022, the original category of “contractors (urban construction)” was renamed “contractors (construction implementation)”, while “companies (urban construction)” was changed to “individual business owners or companies (construction implementation)”. In addition, after the implementation of Law No. 15/2021 – Legal Regime on Fire Safety in Buildings and Enclosures on 17 August 2022, applications for registration by “fire services companies (construction implementation)” are reviewed and followed up by the fire services department.

Technicians

Law No.1/2015 – Qualification System for Urban Construction and Town Planning stipulates professional classifications for technicians. By the end of 2022, the number of valid or renewed registrations for ten types of technicians and engineers totalled 1,120 person-times. As eight people held two professional qualifications, the actual number of registered persons was 1,112. Details are as follows:

Category		New registration	Renewed registration	Total
Technicians (construction and urban planning)	Architects	6	192	198
	Landscape Architects	0	3	3
	Civil Engineers	44	472	516
	Fire Engineers	0	7	7

(Cont.)

Category		New registration	Renewed registration	Total
Technicians (construction and urban planning)	Electrical Engineers	8	100	108
	Electrical and Mechanical Engineers	19	157	176
	Mechanical Engineers	3	91	94
	Chemical Engineers	0	6	6
	Industrial Engineers	0	0	0
	Fuel Engineers	0	2	2
	Engineering Technicians	0	10	10
	Total	80	1,040	1,120

Infrastructure Projects

Private Construction Projects

Based on statistics from the Land and Urban Construction Bureau, in 2022, a total of 23 building projects were completed, providing 500 residential flats with a total floor area of 45,096 square metres, and 48 commercial units with a total floor area of 4,091 square metres. No building projects involving office or industrial/warehouse units were implemented during the year. In addition, a total of 675 parking spaces (437 for private cars and 238 for motorcycles) were completed in car parks, with a total area of 19,616 square metres.

During 2022, construction commenced on 27 private projects providing 400 units with a total floor area of 23,427 square metres, 53 commercial units with a total floor area of 9,561 square metres. No construction projects involving office or industrial/warehouse units were commenced during the year. Construction commenced on 199 parking spaces (146 for private cars and 53 for motorcycles) in car parks, with a total area of 4,745 square metres.

By the end of 2022, 2,424 units were under construction, of which 2,210 were residential units with a total floor area of 138,053 square metres, 198 were commercial units with a total floor area of 36,476 square metres, 14 were office units with a total floor area of 3,328 square metres, and two were industrial/warehouse units with a total area of 3,328 square metres; as well as 1,272 parking spaces (930 for private cars and 342 for motorcycles) in car parks, with a total area of 39,808 square metres.

During the year, a total of 7,747 units were still in the design phase, of which 7,029 were residential units with a total floor area of 523,294 square metres, 711 were commercial units with a total floor area of 144,507 square metres, two were office units with a total floor area of 1,808

square metres, and five were industrial warehouses with a total floor area of 56,401 square metres; as well as 6,126 parking spaces (4,448 for private cars and 1,678 for motorcycles) in car parks, with a total area of 200,911 square metres.

In 2022, 8,004 applications were received for private construction projects, of which 1,798 were for demolition/ maintenance/ renovation, 2,229 were for simple projects in common parts of buildings, food and beverage establishment integrated construction projects, and construction licences, and 496 were for construction/expansion.

During the year, 8,084 applications from 2022 and the previous year were handled, a majority of which were in the above-mentioned three major categories: 2,207 applications for demolition/ maintenance/renovation projects, 1,836 applications for simple projects in common parts of buildings/integrated construction projects for food and beverage establishments/construction licences, and 542 applications for construction/expansion projects.

Construction Document Certification

In 2022, the Land and Urban Construction Bureau's general archive unit handled 5,349 applications for certification of construction documents with approved licences.

Lift Equipment Supervision

Following the restructuring of the Land and Urban Construction Bureau, a new electrical and mechanical services department was created, with responsibility for approving plans related to electrical installations and mechanical equipment, as well as supervising the inspection and maintenance of elevators and escalators, and the installation and operation of large-scale amusement facilities in construction projects.

Under the new legal system guidelines for the approval, acceptance, and operation of elevators and escalators, a total of 9,883 elevators and escalators were registered with the electrical and mechanical services department during the first three quarters after its establishment. There were 570 declarations related to elevators and escalators that were received and processed. To ensure the safety of elevators and escalators, there were 123 random inspections of elevators and escalators throughout Macao, with 122 of them passing the inspections and only one receiving recommendations for improvements. In terms of technical opinions related to private engineering electromechanical plans, 684 opinions were issued to relevant units. In all, 283 applications for temporary licenses for the use of electrical installations were received, with 243 temporary licences approved.

The Elevator and Escalator Safety Legal System was officially published in the *Macao SAR Gazette* on 5 September 2022, and came into effect in April 2023. In the second half of 2022, the Land and Urban Construction Bureau actively developed an online registration platform for elevators and escalators, to enable the industry to register information. The platform was expected to be launched when the new legal system took effect in 2023, and the elevator and escalator database will be upgraded to promote regulatory work through electronic means.

The Public Works Bureau

The Public Works Bureau, formerly known as the Infrastructure Development Office, officially commenced operations with its new name on 1 April 2022. Its main role is to assist in formulating and executing policies related to public construction. It is also responsible for studying, planning, constructing and maintaining public buildings, infrastructure, and other large-scale public construction projects, as well as participating in, coordinating, and executing regional cooperation construction projects. It is under the supervision of the Secretary for Transport and Public Works.

Previously known as the Infrastructure Development Office, the Public Works Bureau has implemented the Macao SAR Government policies regarding the development of public buildings and infrastructure, completing numerous large-scale public projects such as Sai Van Bridge, Hong Kong-Zhuhai-Macao Bridge, the Hengqin campus of the University of Macau, and Qingmao Checkpoint. With the establishment of the Public Works Bureau, public projects of the SAR Government can be more efficiently and effectively expedited, strengthening cooperation between Macao and neighbouring cities and regions, and constructing a sustainable, high-quality living environment for Macao.

Hospitals/Government Buildings

Islands District Medical Complex

The Islands District Medical Complex is adjacent to the Taipa-Coloane Causeway, with a total land lot area of 75,800 square metres. The construction involves seven buildings, in addition to roads, public squares, vehicle flyovers, footbridges and related infrastructure facilities within the area, with a total floor area of 420,000 square metres.

First-phase construction includes: a nursing academy, staff dormitory building, a hospital complex, an auxiliary building, a general service administrative building and a central laboratory building. Construction of the nursing academy was completed. The staff dormitory was completed in September 2022. The hospital complex, auxiliary building, and general service administrative building were completed in December 2022. The construction of the central laboratory building is underway.

Phase 1, Conde S. Januario Hospital Expansion Project - Public Health Specialist Building

Construction of the expansion project superstructure commenced in January 2021. With isolation wards, surgery rooms, laboratories and observation rooms, the expansion building has a passageway linked to the main Conde S. Januario Hospital, and will improve medical and health care facilities, while raising the level of medical services.

New Public Security Police Headquarters Building and New Police Tactical Unit Headquarters Building

Construction of the New Public Security Police Headquarters Building and New Police Tactical Unit

Headquarters Building, at the Macao New Urban Reclamation Zone E1, commenced in January 2021. The office building and underground car parks were constructed to meet the operational needs of relevant departments.

New Customs Service Headquarters Building, Taipa

Construction of the New Customs Service Headquarters Building, at the Macao New Urban Reclamation Zone E1, commenced in January 2021. The office building and underground car parks will meet the operational needs of relevant departments.

Archive Building on Lot O4, Pac On

Construction of the Archive Building at lot O4 at the intersection of Avenida Son On, Pac On and Rua de Heng Long in Taipa commenced in June 2021. The building will be mainly used as a warehouse and equipped with loading and unloading platforms and car parks, to meet the operational needs of relevant government departments.

Government Office Buildings on Lot 12, Outer Harbour New Reclamation Area

Construction of the foundations and basement of the government office buildings on Lot 12 of the Outer Harbour New Reclamation Area commenced in September 2022. Two buildings – one with 12 floors, the other with 21 floors – and an underground car park will be built for government office use.

Government Office Buildings on Lot 25, Outer Harbour New Reclamation Area

Construction of the foundations and basement of the government office Buildings on Lot 25 of the Outer Harbour New Reclamation Area commenced in September 2022. Two buildings – one with 12 floors, the other with 17 floors – and an underground car park will be built for government office use.

Base Court Building on Lots C1 to C4, Nam Van Lake

Construction of the foundations and basement of the Base Court Building commenced in November 2022. The building will have eight floors and an underground car park, and will be connected to the existing Base Court on Lot C2.

Court of Final Appeal Building on Avenida da Praia Grande

Construction of the foundations, basement and exterior wall support of the in-situ conversion project at the old Court Building on Avenida da Praia Grande and the former Judiciary Police

Headquarters on Rua Central began in October 2022. According to the design, the building will have three floors and one basement. The old Court Building will be preserved, and some of its interior will be reorganised to serve new functions. Only the street-facing façade of the eastern wing of the former Judiciary Police Headquarters will be preserved, while the rest of the building will be demolished.

Road Infrastructure

Construction of Vehicle Flyovers at Rotunda da Amizade

The three-dimensional conversion of the Rotunda da Amizade, to alleviate traffic congestion in the area during peak hours, included construction of two one-way vehicle flyovers, with one connecting Avenida do Nordeste and New Urban Zone Area A, and the other connecting Avenida do Nordeste and Ponte da Amizade Avenue. The project was completed in November 2022.

The Fourth Macao-Taipa Cross-Harbour Bridge

The fourth Macao-Taipa cross-harbour bridge starts from the east wing of Macao New Urban Reclamation Zone A, links with the Artificial Island of the Hong Kong-Zhuhai-Macao Bridge, and ends at Macao New Urban Reclamation Zone E1. The 3.1-kilometre-long bridge includes an approximately two-kilometre-long cross-sea section. The bridge is designed to support eight lanes, including two in the middle that will be exclusively for motorcycles.

Construction commenced in 2020 and is underway. In tandem with work on the bridge, construction of the road networks connecting either end of the bridge has commenced. These comprise the Pac On linkage at New Urban Zone Area E and the Avenue Wai Long linkage, with construction commencing in April 2021, and the Hong Kong-Zhuhai-Macao Bridge Artificial Island linkage and New Urban Zone Area A eastern linkage, construction of which commenced in August 2021.

Bridge Connecting New Urban Reclamation Zone A and Macao Peninsula (A2)

Construction of this bridge commenced in November 2022, in conjunction with the overall development of New Urban Reclamation Zone A, in order to connect the Macao peninsula and New Urban Reclamation Zone A.

Road Segment on Western Stretch of New Urban Zone Area A

Construction of a road segment on the western stretch of New Urban Zone Area A commenced in August 2022, in response to needs arising as New Urban Zone Area A is developed.

Common Pipelines in New Urban Zone Area A

Construction of common pipelines in New Urban Zone Area A covers Northern District, Central

District, Southern District, the East Axis and the Zhuhai-Macao Port Artificial Island. With a total length of 6.5 kilometres, the common pipelines form a circular layout around the New Urban Zone Area A, supporting public facilities including power supply, water supply, reclaimed water supply, and communication networks. Open tender procedures for the Central and Northern District sections were completed in November 2022.

Public Housing Projects

To meet the people's housing needs, the Infrastructure Development Office has launched a number of public housing projects since 2007. More than 10 Home-Ownership Scheme Housing and public housing projects were completed, including Edifício do Lago, Taipa; the public housing estates in Seac Pai Van; Bairro da Ilha Verde Building; Rua Central de Toi San; second phase of the Mong Ha Public Housing project; and reconstruction of the sports centre.

Public housing projects that are underway include: Avenida de Venceslau de Morais Public Housing project, and lots B4, B9, B10, A1, A2, A3, A4 and A12 of New Urban Zone Area A public housing phase 1. Tender procedures for the public housing of lots A5, A6, A10 and A12 in New Urban Zone Area A were completed in late 2022.

To implement the housing scheme for senior citizens proposed in the policy address, construction of around 1,800 studio apartments (T0) and the auxiliary social service facilities is underway, on a 6,828-square-metre piece of land adjacent to Avenida Nordeste in Areia Preta.

New Urban Reclamation

In line with Macao's future development and to increase land supply, in 2006 the Government reported its land reclamation plan to the Central People's Government. The whole land reclamation plan received approval from the Central People's Government in December 2009, and the MSAR Government is expediting the land reclamation works.

The new urban reclamation area comprises five parts, with a total area of 350 hectares, and is expected to provide Macao with a land reserve lasting 20 to 30 years. Reclamation works at Area A and Area E were completed in 2017, while works at Area C were completed in November 2022.

Cross-border Cooperation Projects

Access bridge connecting the University of Macau and the Hengqin Border Post of the University of Macau

Located to the south of the Lotus Flower Bridge, the access bridge connects the traffic platform at the Hengqin Port, which is under Macao jurisdiction, and the University of Macau campus. Vehicle and pedestrian passageways have been constructed for teachers, students and staff of the University of Macau, enabling them to travel between the Hengqin Port and alleviate the need to rely on the University of Macau Underwater Tunnel. Construction commenced in December 2021.

Hengqin Extension of the Macao LRT

As a major project to implement the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area, the Hengqin Extension of the Macao LRT will improve the connections between Macao and mainland China cities via high-speed railway. The main structure consists of an elevated bridge, an underwater tunnel and two stations. The extension line is 2.2 kilometres long and the tunnel is 900 metres long. The stations are “HE1 Station”, next to Lotus Flower Bridge Station on the current Taipa Line; and “HE2 Station”, at the basement of Hengqin Port. Construction commenced in March 2021.

LRT Project

The LRT Taipa line commenced operations in 2019. Construction of the Taipa line linkages to the Macao peninsula, Barra Station and Seac Pai Van line is underway. Open tenders for the LRT East Line commenced in October 2022. This line will be approximately 7.7 kilometres long, with six stations, connecting the Border Gate, New Urban Zone Area A, New Urban Zone Area E, and the existing Taipa Ferry Terminal Station of the Taipa Line.

Two open tenders were conducted, one for the southern section, the other for the northern section. The southern section is approximately 4.8 kilometres long, mainly comprising three underground stations, one open-cut tunnel, one single-hole sea-crossing shield tunnel and one open-cut tunnel connecting an elevated bridge. The northern section is approximately 2.9 kilometres long, mainly comprising three underground stations, three shield tunnels, and beach improvement works.

Macao Civil Engineering Laboratory

The Macao Civil Engineering Laboratory was established in 1988, and is a non-profit public legal body engaged in science and technology, which is autonomous in terms of technology, budget and assets. The chairpersons of the Board of the General Assembly and Board of Directors are both appointed by the Government.

The responsibilities of the Macao Civil Engineering Laboratory are to provide civil engineering and related technical support to the Government and relevant industries.

Housing

Housing Bureau

The Housing Bureau aims to fully implement the Government’s public housing policy; rationally allocate public rental housing resources to underprivileged families in need; provide technical coordination and assistance for strata-title buildings management; issue licences to and regulate enterprise owners engaged in strata-title buildings management in accordance with the law; monitor the real estate agency business; and issue relevant licences in accordance with the law.

Home-Ownership Scheme Housing

In the early years, Home-Ownership Scheme housing units were sold to families on the Housing Bureau's waiting list on terms and at prices stipulated in the land grant contracts by the bureau in accordance with Decree-Law No. 13/93/M.

Pursuant to Law No. 10/2011 – “The Home-Ownership Scheme Housing Law” re-promulgated by Executive Order No. 200/2020, the construction of Home-Ownership Scheme Housing is led by the Government and executed by the Housing Bureau or other public authorities appointed by the Chief Executive.

Rationale for Home-Ownership Scheme Housing

Home-Ownership Scheme Housing is intended to assist Macao residents of a particular income level and financial situation to meet their housing needs, and to promote a housing supply that suits the practical needs and purchasing power of Macao residents.

Home-Ownership Scheme Housing Allocation

The process of allocating 1,900 multiple-room Home-Ownership Scheme housing units to those who submitted general applications at the end of 2013 is still under progress. As at 31 December 2022, a total of 1,893 family applicants were allocated housing units.

General application for 3,011 housing units began at the end of November 2019. Detailed assessments of the first batch of 3,011 selected applicants and second batch of 700 selected applicants were completed in July 2021 and March 2022, respectively; and were followed by the third batch of detailed assessments of 500 selected applicants. As of 31 December 2022, there were 2,788 eligible applications, 129 applications under legal procedures, 762 ineligible applications, 115 withdrawn applications, 79 applications with changed priorities, and 338 applications with ongoing assessments.

A new phase of general application for 5,254 housing units was conducted from 14 July to 30 November 2021. A total of 11,707 applications were received. The priority list and cancellation list were announced on 14 December 2022, with 9,796 accepted applications and 1,911 cancelled applications.

Public Housing

Public housing units are distributed in the form of leasing by the Government to families of weak financial standing or with special difficulties. Families of weak financial standing are defined as those whose monthly household incomes and net asset values fall beneath the legally stipulated levels as stipulated by Executive Order.

The allocation and leasing of public housing are regulated by Law No. 17/2019 – Legal System for Public Housing and By-law No. 30/2020 – By-law of Rules for the Implementation of the Legal System for Public Housing.

Granting of Public Housing

The Housing Bureau launched a new round of open applications for public housing in November 2017. After a review of the applications, a waiting list was announced in February 2019, covering 6,355 households. As of 31 December 2022, all applications on the waiting list had been processed. Among them, 3,810 households were allocated housing, and 2,545 households gave up their applications or were delisted.

Public housing was open for ongoing application from 20 August 2020 onwards. As of 31 December 2022, after a review of the applications, a total of 3,283 applications were accepted, with 1,259 of the households allocated housing.

Building Management

The Housing Bureau exercises its supervisory power under Decree-Law No. 41/95/M dated 21 August to manage the common areas of Home-Ownership Scheme housing, and to require relevant parties to fulfil their duties stipulated in the applicable laws and regulations. The Housing Bureau may impose fines on management entities or strata-title building owners who violate their duties as stipulated in the Decree-Law.

The Housing Bureau also facilitates and helps owners of strata-title buildings under the Home-Ownership Scheme with arrangements for setting up management organs and convening the first meetings, and provides technical assistance to owners, management organs and corporate managers of strata-title buildings. In 2022, the bureau handled 4,502 cases of Home-Ownership Scheme management-related affairs, fostered 92 management bodies of Home-Ownership Scheme housing that are already in place and operating effectively, and handled 1,891 cases involving the general assembly of owners of strata-title buildings under the Home-Ownership Scheme and affairs regarding the operations of management bodies. There were 4,264 cases of providing technical assistance for the management of common areas in private housing.

The Housing Bureau also keeps abreast of all necessary renovation and improvement works for public housing. In addition to public facilities of housing estates, it strives to improve indoor facilities, so as to improve the quality of life of its tenants, particularly for elderly single people.

Strata Title Buildings Management Commercial Operation

In accordance with the Law on the Commercial Management of Strata Title Buildings effective from 22 August 2018, it is mandatory to obtain a valid licence to engage in commercial management of strata-title buildings. As at 31 December 2022, a total of 248 licences for commercial management of strata-title buildings had been issued.

In 2022, the bureau conducted 25 inspections of strata-title buildings, received complaints from strata-title building management company owners, and handled cases referred by other public departments, to monitor compliance with the Law on the Commercial Management of Strata Title Buildings by strata-title building management company owners, and to initiate disciplinary proceedings arising from alleged administrative irregularities. In 2022, 21 cases involving strata-

title building management company owners resulted in penalties for breaking the law.

The Property Maintenance Fund

To encourage and help homeowners to perform their duties regarding maintenance of common building areas, in March 2007 the Housing Bureau established the Property Maintenance Fund to assist them with inspecting, testing and repairing, and establishing management bodies for the common areas of private housing.

In accordance with the Executive Order, the seven schemes were consolidated into four schemes, together with expanding coverage of the subsidies and increasing the amount of subsidies. This amendment came into effect on the day following its promulgation on 29 November 2021.

As at 31 December 2022, 448 applications for the seven schemes under the Property Maintenance Fund were approved, with subsidies totalling over 45 million patacas. A total of 5,478 applications have been approved since the establishment of the fund, granting subsidies totalling 530 million patacas.

Joint Centre for Building Leakage Issues

Through cross-departmental cooperation among the Land and Urban Construction Bureau, Municipal Affairs Bureau, Health Bureau, Legal Affairs Bureau and Housing Bureau, the Government established the Joint Centre for Building Leakage Issues in 2009. The centre provides one-stop assistance to owners of flats that are origins of leaks to encourage maintenance. In 2022, 2,058 cases were filed for investigations; and there was follow up work on 2,619 cases*, 1,970 of which were completed**.

Squatter Area Clearance

To comply with Macao's urban planning policies and the reallocation of land use, the Housing Bureau is committed to clearing squatter camps and relocating affected residents. In 2022, two squatter dwellings were demolished. By the year-end, 409 squatter dwellings remained, of which 183 were on the Macao peninsula and 226 in the Islands District.

Real Estate Agency Business

According to the Real Estate Agency Law, which took effect on 1 July 2013, all real estate agents and brokers are required to obtain a valid licence before engaging in business. The Housing Bureau has also set up a unit to follow up applications for licences for real estate agents and brokers, and be responsible for the relevant monitoring work.

Issuing Relevant Licences

As at 31 December 2022, the numbers of licences issued for real estate agents and brokers totalled

2,631 and 10,591, respectively.

Supervision

To facilitate the implementation of laws and various tasks, during 2022 about 3,158 inspections were conducted in business premises of real estate agents, to check compliance with the Real Estate Agency Law by real estate agencies, and to initiate disciplinary proceedings against alleged administrative irregularities. Complaints about real estate agents and brokers were received and handled in accordance with the relevant laws.

During 2022, 33 cases involving real estate agents and seven cases involving real estate brokers resulted in penalties for breaking the law.

Land Management

Lands Committee

The Lands Committee is a consultative body supervised by the Secretary for Transport and Public Works. The committee is responsible for advising on cases concerning granted land, land use by recipients of land grants, public use of granted land; and granting, renewing, renouncing or cancelling temporary land-occupation licenses.

Land Concessions

According to the Land and Urban Construction Bureau, 18 land grant contracts were completed, one order for land exchange was cancelled and four orders for land return were issued in 2022. These contracts were as follows:

- Leases and grants: seven contracts, with a total newly granted area of 29 square metres and returned land with a total area of 191 square metres, involving a total floor area of 1,683 square metres;
- Long-term leases: eight contracts, all for returned land with a total area of 106 square metres and a total floor area of 2,884 square metres;
- Gratuitous concessions: one contract, involving a total floor area of 2,836 square metres;
- Renewed concessions: two contracts, involving a total floor area of 1,264 square metres; and
- Returned land: one contract, involving a total floor area of 1,544 square metres.

The land granted in 2022 was mainly for residential, commercial, hotel, car parking and other development uses. No land was granted for industrial; office or social facility uses. The premiums under land grant contracts during the year totalled 642,146,862 patacas. Actual income received from land premiums during the year totalled 153,766,423 patacas.

The Council of Architecture, Engineering and Urbanism

The Council of Architecture, Engineering and Urbanism (CAEU) has been established according to Law No.1/2015 – Qualification System for Urban Construction and Town Planning, in order to accredit and register holders of professional degrees in 13 subjects: architecture, landscape architecture, urban planning, civil engineering, fire engineering, environmental engineering, electrical engineering, electrical and mechanical engineering, mechanical engineering, chemical engineering, industrial engineering, fuel engineering and transport engineering.

According to information from the Land and Urban Construction Bureau, application for accreditation and registration is only open to those who have been approved for completion or exemption of field training, and have passed qualifying examinations.

During 2022, 59 people were approved for professional registration after second review; they were from six disciplines: civil engineering, architecture, electrical and mechanical engineering, electrical engineering, mechanical engineering and environmental engineering. From the law coming into effect in 2015 till the end of 2022, accredited professionals in the 13 disciplines totalled 2,690, with the breakdown as follows:

Professions	Numbers of registered professionals (2022)	Numbers of registered professionals (2015-2022)
Civil Engineering	33	1,105
Architecture	3	421
Electrical and Mechanical Engineering	18	337
Electrical Engineering	2	316
Mechanical Engineering	1	277
Environmental Engineering	2	95
Urban Planning	0	58
Chemical Engineering	0	22
Traffic Engineering	0	19
Fire Engineering	0	18
Landscape architecture	0	17
Industrial Engineering	0	3
Fuel Engineering	0	2
Total	59	2,690

In 2022, a total of 155 practitioners of various professional disciplines received council approval to join internships. As at the end of 2022, the number of practitioners since the law came into effect

was 848, with details as follows:

Professional Discipline	Number of Interns (2022)	Number of Interns (2015-2022)
Civil Engineering	73	441
Architecture	25	135
Electrical and Mechanical Engineering	22	120
Electrical Engineering	21	80
Mechanical Engineering	9	49
Environmental Engineering	2	12
Urban Planning	2	5
Fire Engineering	1	3
Landscape architecture	0	3
Total	155	848

In 2021, a total of 47 practitioners of various professional disciplines received council approval to register as internship instructors. As at the end of 2022, the number of instructors since the law came into effect was 652, with details as follows:

Professional Discipline	Number of internship instructors (2022)	Number of internship instructors (2015-2022)
Civil Engineering	30	285
Architecture	3	113
Electrical and Mechanical Engineering	4	109
Electrical Engineering	3	60
Mechanical Engineering	3	54
Environmental Engineering	4	15
Urban Planning	0	6
Fire Engineering	0	6
Chemical Engineering	0	1
Landscape architecture	0	1
Fuel Engineering	0	2
Total	47	652

In 2022, a total of 97 practitioners of nine professional disciplines were approved for qualifying examinations. As at the end of year, the total number since the law came into effect was 379, with details as follows:

Professional Discipline	Number of practitioners eligible for qualifying examinations (2022)	Number of practitioners eligible for qualifying examinations (2015-2022)
Civil Engineering	53	223
Architecture	12	55
Electrical and Mechanical Engineering	12	45
Electrical Engineering	7	26
Mechanical Engineering	8	16
Urban Planning	2	5
Environmental Engineering	3	7
Fire Engineering	0	1
Landscape architecture	0	1
Total	97	379

In accordance with Law No. 1/2015 – “Qualification System for Urban Construction and Town Planning”, those in the private sector who have completed at least two years of internship in a relevant professional discipline and obtained examination candidateship, and those public administrative workers who hold a professional degree in a relevant discipline, having been engaged with the relevant profession for at least three consecutive years, and have obtained a waiver of internship from the council, are eligible to sit for the qualifying examination of the relevant professional discipline.

The CAEU held three qualifying examinations during 2019-2021, with 161 candidates passing the examination and obtaining professional qualifications. The 2022 qualifying examination – a written test – was held at the end of the year, and was attended by 160 candidates from eight professions: architecture, civil engineering, electrical engineering, electrical and mechanical engineering, mechanical engineering, fire services engineering, environmental engineering and urban planning. Only those who passed the written test would be eligible for the second-phase professional interview.

Urban Planning Committee

The Urban Planning Committee, established in accordance with Law No. 12/2013 – Urban Planning Law, serves as the Government’s consultation body and is responsible for discussing and providing opinions on compiling, implementing, reviewing and amending urban plans; advising on the scope for issuing urban planning conditions according to the law; initiating discussions and providing suggestions to the Urban Development Strategy Study; by-laws and draft bills related to urban planning; urban planning technical requirements and guidelines; and other matters assigned by

the Chief Executive.

In 2022, the Urban Planning Committee followed up on and discussed 52 planning conditions. In accordance with the provisions of Law No. 12/2013 – Urban Planning Law, the committee listened to a briefing on the detailed planning of Eastern District-2, then held discussions and provided suggestions. The committee also headed to New Urban Zone Area, to conduct an on-site visit to the common pipeline project, to understand the facilities and progress with project construction.

Urban Renewal Committee

The Urban Renewal Committee, established in accordance with By-law No. 5/2016 – “Urban Renewal Committee”, serves as a government advisory body on formulating urban renewal policy, and is responsible for coordinating between urban renewal policy strategies and other sectorial policies; launching policy management measures and urban renewal campaigns; anticipating the effects of implementing urban renewal measures and actions; conducting research and providing solutions and recommendations on urban renewal related by-laws and draft bills and regulations.

In 2022, during a plenary meeting, the Urban Renewal Committee listened to a briefing on the Study on Housing Policy for Residential Purposes presented by representatives from the Policy Research and Regional Development Bureau and University of Macau, and exchanged opinions with the representatives.

Cross-department Committee

The Cross-department Committee was established in accordance with By-law No. 5/2014, to liaise and follow up regarding the compilation, review, revision and assessment of implementation of urban planning.

There are eight members of the Cross-department Committee, each with a three-year tenure. They are the Director of the Land and Urban Construction Bureau, who was appointed as the coordinator, and representatives from the Cultural Affairs Bureau, the Municipal Affairs Bureau, the Transport Bureau, the Infrastructure Development Office, the Environmental Protection Bureau, the Housing Bureau and Macao Government Tourist Office.

Executive Order No. 133/2022 stipulated the formulation of a draft plan for the detailed planning of Eastern District-2, which aims to create a new liveable community on the Macao peninsula, while establishing overall planning rules for the areas covered in the plan. The Cross-department Committee exchanged views on the contents and work arrangements of the draft plan, launched a 60-day public consultation to collect opinions and suggestions from all sectors of society, and organised a briefing session for the Urban Planning Committee.

Electronic Optimisation

The Land and Urban Construction Bureau has launched a total of five online application services

to support the operations of the CAEU, and linked the Professional Qualifications for Urban Construction and Town Planning to the Macao One Account eWallet. In addition, a photo upload function has been added, to link with Macao One Account, thus streamlining the procedures for online or offline applications related to professional accreditation and registration.

During the year, the Land and Urban Construction Bureau optimised its related electronic services, by adding GovPay as an electronic payment option to the existing payment method provided by the Postal Savings Office.

Water Disposal System

Macao's water disposal system includes the independent networks of the Macao peninsula and Taipa and Coloane islands. Details are as follows:

Water Drainage Systems in 2022									
Type Area	Public sewer system (metres)				Rainwater drains (units)	Public sewage inspection pit (manhole) system (units)	Public rainwater pipe outlets (units)	Outlet valves (units)	Pumping stations (units)
	Sewage piping	Rainwater piping	Combined piping	Flow interceptors (rainwater and sewage)					
Macao	106426.21	110311.64	60036.22	19016	16883	11928	177	27	31
Taipa	37601.78	68561.25	432.67	26607.7	5471	4167	77	1	24
Coloane	26909.74	30907.87	0	16110.5	2183	1985	52	1	18
Total	170937.73	209780.76	60468.89	61734.2	24537	18080	306	29	73

The Drainage Division of the Municipal Affairs Bureau is responsible for cleaning and dredging the drainage systems of Macao, inspecting and monitoring their operations, making improvements, and registering relevant information.

During 2022, the Drainage Division received approximately 2,200 complaints related to sewage systems, 20 percent less than in 2021. In addition, the division cleared and cleaned over 244,000 metres of public sewers and rainwater drains, in more than 31,800 clearing and cleaning operations. The division conducted 839 inspections of grease traps in food premises, issued 99 on-site records for places with malfunctioning grease traps, conducted 589 inspections of construction site drainage, and prosecuted 32 cases of illegal polluters.

Slopes

To enhance monitoring of various slopes in Macao, the Government set up a slope safety task force in 1995, to help with classifying the risk levels of slopes through regular onsite inspections, and identifying areas for strengthening and maintenance.

The slope safety task force mainly comprises engineers from the Public Works Bureau, the Land and Urban Construction Bureau, the Municipal Affairs Bureau and the Macao Civil Engineering Laboratory.

According to government statistics, there were 265 risky slopes throughout Macao in 2022.

During the year, the Public Works Bureau conducted two slope improvement projects, and the Municipal Affairs Bureau followed up on 18 slope improvement projects.

Number of slopes / risk	High	Medium	Low	Total
Macao peninsula	85	33	0	118
Taipa island	44	24	1	69
Coloane island	60	18	0	78
Total	189	75	1	265

In 2014, the Government began setting up an automatic slope monitoring system at Taipa Grande. The system effectively provides real-time monitoring of slope data. The real-time data on slope dislocation, subsidence and cracks is sent to the Macao Civil Engineering Laboratory and the Public Works Bureau, enabling early precautionary measures and alerts.

The second monitoring system in Macao was set up at Mount Fortress slope slot. It commenced operations in 2020, to better support the real-time monitoring on the Macao peninsula and the Islands District.

Surveying and Mapping

Cartography and Cadastre Bureau

The Cartography and Cadastre Bureau is supervised by the Secretary for Transport and Public Works. It specialises in setting up and maintaining the Government's Geodetic Control Network and Geometric Levelling Network. In addition, the bureau supports land-management activities, drafts maps of various types and scales, and maintains the cadastre management.

Cadastre Management

The Cadastre Division of the Cartography and Cadastre Bureau has operated a cadastral database since 1983. The bureau also produces cadastral maps in accordance with the provisions of the Cadastre Law. The division continuously updates related information. The Cartography and Cadastre Bureau launched the Cadastral Information Net in 2008 and an online shop for cadastral maps in 2011. In 2019, the Cadastral Information Net became accessible on mobile devices. In 2021, the digital cadastral map service was launched.

The Cadastre Division also provides survey information from its database to landowners who need to re-measure land boundaries for valuation, transaction or development purposes.

Land Surveying and Cartography

The Cartography and Cadastre Bureau provides a wide range of land survey and cartography services. It also provides topographical maps at various scales with Chinese and Portuguese footnotes, digital cartography of Macao, aerial photos taken in 1941, 1980, 1988, 1993 and 1998, posters, the map of the Macao SAR and its peripheral regions, and thematic maps.

Satellite Positioning Reference Station

To ensure that the satellite positioning services can effectively cover all areas of Macao, the Cartography and Cadastre Bureau established and began operating four Global Positioning System (GPS) reference stations – at Mount Fortress, Alto de Coloane, Taipa Grande on Taipa island and the University of Macau – in 2002, 2005, 2008 and 2016, respectively. The reference stations can receive both GPS signals, data from the Russian GLONASS system (Global Navigation Satellite System) as well as BeiDou Navigation Satellite System (BeiDou), supporting the applications and development of land, cadastral and engineering surveys of Macao, as well as data collection for the Geographic Information System (GIS).

The satellite positioning reference stations provide three main services. The first two provide satellite observation data download services and automatic coordinate calculation services through the Macao Satellite Positioning Reference Station Service (mosref.dscg.gov.mo) launched in 2009. The other is an NTRIP (Networked Transport of RTCM via Internet Protocol) service launched in 2012. Real Time Kinematic (RTK) corrections were provided to professional users through 3G mobile communication and internet technologies, enabling them to use real-time GPS applications that are accurate to within a centimetre. In 2021, the Reference Station Service website was optimised and began providing satellite reference data from the BeiDou Navigation Satellite System for public use.

In 2013, the bureau and Hong Kong's Lands Department shared data from their own satellite positioning reference stations. The bureau also expanded the coverage of real-time dynamic positioning services to the waters between Hong Kong and Macao and the western part of Hong Kong, thereby providing a more stable and reliable satellite positioning service to all users.

Geographic Information System

In response to society's needs, the Cartography and Cadastre Bureau has introduced various kinds of geographic information systems, including the Cadastre Information Web (cadastre.gis.gov.mo), a comprehensive land information platform that combines information from various departments on land and buildings. Users can inquire about land grants, easement and commitment, buildings, locations, drawing easement, plans for urban conditions, prior approval for buildings under construction, maximum altitude for buildings in the neighbouring area of the Guia Lighthouse, lists of historic urban areas and heritage under conservation, boundary of the special administrative region, and other pertinent information.

In addition, the website contains statistical data, executive procedures and laws related to land. By the end of 2022, the website had received over 1.71 million visitors since its launch in 2008. The website supports desktop and mobile devices, meeting the needs of different users.

The Macao Online Map (webmap.gis.gov.mo) provides geographical information to meet citizens' everyday needs in traditional Chinese, simplified Chinese, Portuguese and English. Citizens can search for 60 kinds of useful information on everyday life, including on buildings, streets, government departments, tourist spots, food and beverage, and emergency shelters in Macao – catering to needs including eating, housing, transportation, sports and recreation.

The *Macao Online Map* features a *Walking Routes Map*, which includes recommended walking routes and times required. In 2020, *Macao 3D Map* was launched. This supports mobile devices, allowing the public to visualise a three-dimensional picture of the whole of Macao from multiple viewing angles. Since its launch in 2001 till the end of 2022, the online map has received more than 8.12 million visitors.

In line with the development of information technology and in response to public demand, in 2012 the Cartography and Cadastre Bureau introduced the *Macao Map* iOS/Android app. In addition to searches for buildings, streets and street numbers, the application also allows users to search for nearby points of interest and share information about attractions, and can show aerial photographs and offline maps, providing on-the-go geographic information required by users.

An updated version of the *Macao Map* was published in 2018, with enhanced route planning function integrating all smart footpaths and vehicle road networks throughout Macao, providing the shortest routes of four travel categories – walking, leisure, bus routes and driving.

GeoGuide for Emergencies is a geographical iOS / Android app that enables the public to obtain the latest emergency-related geographical information through their mobile phones. It was launched by the Cartography and Cadastre Bureau with the support of the Unitary Police Service, the Meteorological and Geophysical Bureau (SMG), the Environmental Protection Bureau, the Marine and Water Bureau, the Education and Youth Affairs Bureau (DSEJ), the Social Welfare Bureau and the Municipal Affairs Bureau. *GeoGuide for Emergencies* provides the public with important geographical information about regions that may be affected during all levels of storm surges, as well as areas that are expected to be affected by the suspension of power, emergency shelters, assembly points for people with limited mobility/places to stay during an emergency evacuation, pre-planned walking routes to the nearest emergency shelters, and real-time alerts about bad weather, real-time water level monitoring data, real-time maritime information and risk/

disaster prevention guidelines.

To support the development of a smart city, the Cartography and Cadastre Bureau launched the Applications Programming Interface for Geographic Information service in 2021, providing a programming interface for map services across Macao. The latest online maps of Macao are displayed through webpages and mobile apps, boosting the application of geographic information.

The Cadastral Information Net (intranet version) provides real-time land information for public works, housing, land planning and management, environment supervision and municipal administration. As well as information available on the Cadastral Information Net, the intranet version provides Government departments with information such as forms of land use, aerial photos and satellite photos over the years, land area and housing record codes.

In 2020, the Information Centre of DSCC Applications was launched. This provides key services, geographical statistical data, geospatial information, and a three-dimensional map covering the entire Macao. These services enable the public to obtain the latest practical information on geography and land registration through their mobile phones, at any time.

Electric Power

The third 220kV interconnection of the Guangdong-Macao electricity network and the Pac On Substation commenced operations in August 2022, enabling power supplies via three interconnections, in northern, central, and southern Macao. The power supply capacity from mainland China was raised from 1,400 MW to 1,750 MW, not only meeting Macao's demand in terms of capacity but also achieving an unprecedented level of safety, further ensuring the stability of Macao's power supply.

Following the implementation of electricity subsidies in 2020, in response to the impact of the pandemic on the economy and people's livelihoods, the SAR Government again implemented the Electricity Subsidy Measures for Households and Business Establishments in 2022. Residential and non-residential users received subsidies of 300 patacas and 3,000 patacas per month, respectively, during the billing months from June to November. Meanwhile, the Government continued to offer an electricity subsidy of 200 patacas per month per household in 2022.

Natural Gas

During 2022, the Government continued optimising the natural gas pipeline network and completed the construction of the Macao-Taipa cross-harbour gas supply pipeline, to extend the gas supply network to the southern part of the Macao peninsula, further improving the gas supply network on the peninsula.

The Government will continue expanding the coverage of the Macau Peninsula gas pipeline network, while encouraging large hotels, tourist facilities and businesses to prioritise or switch to natural gas.

By the end of 2022, 23.3 kilometres of the project to construct a 34-kilometre natural gas trunk

pipe network on the Macao peninsula had been completed, representing a 68.5 percent completion rate.

Utility Tunnels

The Environmental Protection Bureau continued to assist in expediting the construction of the common pipeline in New Urban Zone Area A.

Energy Efficiency and Conservation

The Environmental Protection Bureau and relevant departments continued to promote and implement measures to introduce and promote environmentally friendly vehicles according to schedule. By the end of 2022, there were 5,082 electric vehicles in Macao, including 3,058 light vehicles, 820 heavy vehicles, 996 heavy motorcycles and 208 light motorcycles.

Since the launch of the scheme for installing electric vehicle charging stations in public car parks in 2016, as of the end of 2022, a total of 2,646 public charging stations had been installed, including 2,146 charging stations for light vehicles (in 57 public car parks and along seven public roads) and 500 charging stations for motorcycles (in 42 public car parks).

In addition, some public car parks have installed cabinets for exchanging electric motorcycle batteries. The Environmental Protection Bureau will continue encouraging relevant departments to install electric vehicle and electric motorcycle charging facilities in suitable public car parks, and plan for the next phase of the public charging station scheme. Also, the Instructions for the Installation of Electric Vehicle Charging Facilities in Private Car Parks were updated in August 2022.

Since the launch of the large-scale replacement of smart meters in 2021, it was planned that 50,000 meters would be replaced every year, so that all electricity meters in Macao would be smart meters by 2025. As of the end of 2022, smart meters accounted for more than 40 percent of all electricity meters in Macao.

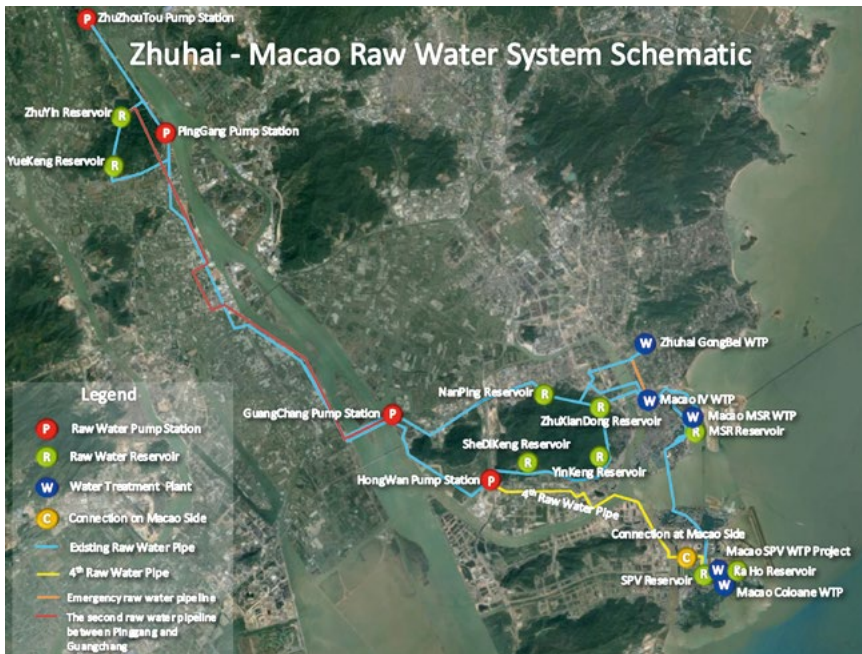
Drinking Water

Macao Water Supply Company (or “Macao Water”)

Established in 1935, the Macao Water Supply Company (Macao Water) is a private enterprise in Macao which provides a safe, reliable and quality water supply service. The company signed a 25-year water-supply concession contract with the Government in 1985. In 2009, the contract was extended for 20 years, to 2030.

Raw Water Supply

Macao’s raw water supply from Zhuhai has two main components: the southern pumping station opened in 1988 and part of the Zhuyin Pumping Station opened in 2007. The two stations are connected by the Guangchang Pumping Station. The layout of the whole system is shown in the map below.



On the map, the red labels mark the locations of four major raw water booster pumping stations, for which Zhuzhoutou, Pinggang and Guangchang are the major water inlets. Some 95 percent or more of Macao's raw water comes from the Xijiang (West River). Starting from 2006, to mitigate salinity effects, the raw water intakes located at Modaomen, Zhuhai, have been moved over 20 kilometres upstream, which was extended to Pinggang pumping station. In 2011, it was extended to Zhuzhoutou pumping station.

The green labels identify reservoirs, including the Outer Harbour Reservoir, the Seac Pai Van Reservoir and Ka Ho Reservoir in Macao, and Zhuxiandong Reservoir, Nanping Reservoir, Shedikeng Reservoir in Zhuhai. To mitigate salinity effects, the Zhuyin Reservoir was built in Pinggang, with a total volume of 40 million cubic metres, and became operational in autumn 2011.

The pipeline with yellow labels is the fourth raw water pipeline, which began supplying water to Macao in the fourth quarter of 2019. The pipeline transfers raw water to Seac Pai Van Reservoir directly from Hongwan pumping station.

The pipeline with red labels is the second Ping Gang-Guang Chang raw water pipeline which was jointly constructed by Guangdong and Macao, and began supplying water in October 2020. This enables the West to East Water Diversion Project in Zhuhai and Macao to achieve dual-line operation, with a daily water supply capacity of two million cubic metres, significantly enhancing Macao's ability to ensure water supply security.

In 2022, Zhuhai supplied about 253,000 cubic metres of water to Macao each day, which totalled 92.37 million cubic metres of raw water throughout the year. The water quality was certified as Grade II, according to mainland China's Environmental Quality Standards for Surface Water

(GB3838-2002), except during occasional salt tides in winter and spring.

Water Treatment, Storage and Transportation

Macao's water treatment capacity is currently 520,000 cubic metres per day. The combined storage capacity of Macao's reservoirs (including the clean water pond and high pool in the water treatment works) is 94,000 cubic metres. In 2022, the total length of main pipelines was 643 kilometres.

At the end of 2022, the total volume of raw water stored in Macao's reservoirs (including the Main Storage Reservoir, the Outer Harbour Reservoir and the Seac Pai Van Reservoir) was 2.68 million cubic metres, including 1.6 million cubic metres in the reservoir near the Outer Harbour. The Ka Ho Reservoir underwent expansion from 2019 to 2022 and was officially handed over to Macao Water at the beginning of 2022. It has a capacity of 740,000 cubic metres.

A total of 90.29 million cubic metres of water were supplied in 2022, 2.6 percent less than in 2021. The daily average volume supplied in 2022 was around 247,000 cubic metres, with a maximum of 277,000 cubic metres recorded on 14 September. In 2022, the total capacity of water sales was 83.25 million cubic metres, with a daily average of 228,000 cubic metres.

Testing Water Potability

The Macao Water Laboratory and Research Centre shoulders the responsibility of testing water quality, and ensuring the quality of water supplies. On a daily basis, the Laboratory and Research Centre and Municipal Affairs Bureau Laboratory jointly analyse random water samples taken from water processing plants and sampling points of pipelines every day. The quality of water from the water processing plants has always reached the standard specified in the contract signed with the Government and the potable water standard stated in Annex One of the Macao Drainage Regulations. In addition to water quality monitoring and testing of treated water, the Laboratory and Research Centre of Macao Water also monitors the quality of raw water supplies from Zhuhai to Macao and reservoirs in Macao, and issues warnings if pollution is detected; and provides firsthand information on raw water for production purposes, to ensure the water is safe for consumption.

In 2000, the Laboratory and Research Centre was issued a Laboratory Accreditation Certificate of ISO/IEC17025 Standard by the China National Accreditation Service for Conformity Assessment (CNAS).

Over the years, the Laboratory and Research Centre has achieved distinguished results in the inter-laboratory sample checks administered by its parent company - Lyonnaise des Eaux Group, and has been repeatedly regarded as a reference laboratory within the group.

Customer Services

Macao Water promptly and properly handles customer enquiries and provides customer services through a consolidated customer information system. Over the years, it continues to improve its services by providing convenient payment and enquiry services, exploring communication channels for customers, and actively fulfilling its corporate social responsibility.

Macao Water has continued to develop a variety of payment platforms that allow customers to pay charges flexibly. It has launched several convenient electronic services, including an official website, QR codes in water bills, electronic billing, a safe email box co-established with the Macao Post and Telecommunications Bureau, an official WeChat account, mobile payment, and Macao One Account allowing residents to easily handle water supply services.

Macao Water set up a customer liaison group and a customer service unit in 2000 and 2012, respectively, to closely liaise with customers and understand their opinions on water supply services.

To raise public awareness about saving water, Macao Water fully supports the Government in the new water charges system, which was introduced on 1 January 2011. This was the first time an itemised and sliding scale of water tariffs was launched, and a waiver of fees was offered for the first five cubic metres of water used by senior citizens with financial difficulties and individuals who receive the Social Welfare Bureau's single-parent or medical subsidies or subsidies for the disabled.

As at the end of 2022, Macao Water had 268,364 customer water metres, in 235,522 households, 30,375 companies and 2,467 government institutions.

Supporting Sustainable Development

As a public enterprise, Macao Water has taken up the social responsibility of caring, environment protection and sustainable development. Its corporate social responsibility committee is responsible for leading and supervising the consistent execution of sustainability initiatives in the company's operations and decision making. Since 2010, Macao Water has published an annual sustainable development report, as specified in the requirements of the Global Reporting Initiative (GRI), leading to Macao Water being awarded the "Services Institution with Verified Disclosure" logo.

Macao Water was honoured with the Best Sustainability Report for a Non-listed Company in Hong Kong ESG Reporting Award for three consecutive years. Macao Water won the Best Sustainability Report Award for a Non-listed Company - Grand Award in 2019; the Best Sustainability Report Award for a Non-listed Company, Excellence in Environmental Positive Impact and Excellence in Social Positive Impact in 2020; and the Best GRI Report in 2021.

Starting from 2000, Macao Water was awarded the CNAS-CL01 (in compliance with ISO/IEC 17025) Accreditation Criteria for the Competency of Testing and Calibration Laboratories by Laboratory and Research Centre of Macao Water, ISO 9001 Quality Management System Accreditation, an ISO 45001 Occupational Health and Safety Management System certificate, an ISO 14000 Environmental Management certificate, an ISO 22000 Food Safety Management System Certificate, an ISO 50001 Energy Management System certificate, and an ISO 27001 Information Security Management System certificate.

Power Supply

Companhia de Electricidade de Macau

Companhia de Electricidade de Macau (CEM) is a public utility company with the sole concession

to generate, transmit, distribute and sell high, medium and low voltage electricity in Macao. The total capacity of CEM's power generation equipment is 408 MW.

From 1906 to 1972, the electricity supply service was managed by the Macao Electric Lighting Company, headquartered in Hong Kong. In 1972, the company was replaced by CEM.

CEM was restructured with the former Portuguese administration's support in 1982. In 1984, CEM was linked to the Guangdong Power Grid through two 110 kV overhead lines. Cables of the power grid were modified, upgraded and added multiple times in 2006, 2007, 2008, 2015 and 2022. As a result, there are eight 220 kV power cables with a transmission capacity of 2,800 MVA.

In November 2010, the Government and the CEM signed a contract stipulating a 15-year extension to power supply services. The new contract terms came into effect on 1 December 2010.

Since 1987, the Government, which was previously the largest shareholder in CEM, has reduced its holding to just eight percent. Currently, 63 percent of CEM's shares are owned by two major shareholders: Nam Kwong Development (HK) Limited, which holds 42 percent, and Energy Asia Consultancy Limited, which holds 21 percent. Moreover, Polytec Industrial Limited and Asiainvest (IP Holding) hold 11 percent and 10 percent, respectively. China Power International Holding holds six percent of the shares, and other investors own the remaining two percent.

Electricity consumption in Macao increased rapidly during the 1990s. In 1998, CEM decided to invest in developing Coloane B Power Station, which uses multi-cycle gas turbine technology.

Conditions of Operations

In 2022, CEM's capacity peaked at 985.5 MW on 24 August, five percent below the peak capacity in 2021.

The Macao electricity transmission network comprises 27 primary substations, eight high-voltage substations and 1,060 kilometres of 66 kV high-voltage cables, 110 kV cables and 220 kV cables. Connected by eight primary 220 kV transmission lines and four backup 110 kV transmission lines, the Guangdong-Macao electricity network forms a power transmission network structure with three 220 kV interconnections – in northern, central and southern Macao – for power transmission in Macao.

The 11 kV medium-voltage electricity transmission network comprises 1,670 user transformer rooms (11 kV/400 V) and 43 mid-voltage substations, and is connected by cables with a total length of 2,595 kilometres. The low-voltage transmission network comprises 986 kilometres of cable, while the street lighting network comprises 591 kilometres of cable and 16,219 streetlights¹. CEM's power network almost entirely comprises underground cables.

Electricity Output and Consumption

CEM generated 406.2 GWh of electricity during 2022, representing an increase of 41.6 percent from 2021. The amount of electricity imported from mainland China was 4,873.7 GWh, representing a

¹ Including 11,660 light poles and 4,559 wall-mounted streetlights

decrease of 6.1 percent over 2021, and accounting for 89.6 percent of total electricity consumption; and electricity purchased from the Macao Central Incineration Centre totalled 161.7 GWh. CEM's sales for 2022 totalled 5,243 GWh.

Customer Services

CEM established the CEM Customer Liaison Committee in 2000. With its members coming from 25 different community organisations, the committee serves to reflect public views of CEM's services, and to receive and make suggestions for improvement. At the end of 2022, CEM was providing services to 276,522 households. The Macao peninsula accounted for 80.11 percent of the total customer base; Taipa, 13.97 percent; Coloane, 5.87 percent; Cotai, 0.01 percent; and Hengqin, 0.05 percent.



Children's playground in Lam Mau





The Municipal Affairs Bureau has turned a piece of idle land near Avenida Marginal do Lam Mau into a temporary leisure area, featuring a comprehensive fitness area and a children's playground, thus making good use of land resources for better outdoor public leisure spaces. The playground was opened to the public on 13 November, and features six distinctive facilities: a high-rise play zone, a sandpit zone, a slide zone, an artificial grass hill, a swing area and a roller skating rink. This is the first leisure area on the Macao peninsula to feature a sandpit, and is a playground suiting parents and children, full of creativity and inspirations.