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LAND, INFRASTRUCTURE, HOUSING AND PUBLIC UTILITIES



Land, Infrastructure, Housing and Public Utilities

Lands, Public Works and Transport Bureau

The Lands, Public Works and Transport Bureau (DSSOPT) is a public administrative authority that provides support to other branches of government in matters of land utilisation and management, urban planning, infrastructure, and basic services.

Urban Planning and New Urban Reclamation

Master Plan

In accordance with the principles and guidelines set out in the Macao Special Administrative Region Urban Development Strategy Study (2016-2030), and following the relevant legal and regulatory requirements set out in the Urban Planning Law, the DSSOPT commenced drafting Macao's urban development master plan, following the submission of the master plan and technical report draft compiled by a research unit to the DSSOPT in 2019. The related public consultation is expected to be conducted in 2020.

New Urban Zone Area A

Based on the planning and study for New Urban Zone Area A, two planning condition drafts were displayed to the public in 2019. The area will mainly be a location for public and infrastructure facilities, supporting people's livelihoods.

According to the planning, New Urban Zone Area B will be developed into an administration and judicial zone, with buildings hosting seven bureaus: the Court of Final Appeal, the Court of Appeal, the Base Court, the Public Prosecutions Office, the Commission Against Corruption, the Commission of Audit and the Unitary Police Service. The DSSOPT is also conducting the related study and planning for comprehensive public infrastructure and road systems of the administration and judicial zone, to prepare for constructing the new buildings.

The DSSOPT has continued to enhance the planning of New Urban Zone Area E, finalising the land lots and layouts of road networks, public facilities and infrastructure, and detailing the land use. In 2019, two planning condition drafts were displayed to the public, marking progress with the work on drafting plans for Area E.

Project Plans

As regards project plans, the report on the final results of the revised overall planning of the Macao border checkpoints and their neighbouring regions was submitted to the DSSOPT. Once approved, the completion of the study report will herald the beginning of the technical stage, which will lead to deliverables including a master plan covering land use, transportation layout, public facilities and infrastructure, as well as public open areas in the area, and a plan for executing the work.

As regards the planning of the Coloane Lai Chi Vun and Rua dos Navegantes Promenade, based

on the results of immobile heritage assessments by the cultural authorities and the Report on the Overall Plan for Flood Prevention and Drainage at the west side of Coloane, initial recommendations have been submitted to the DSSOPT. Further revisions are being made, including refinements to the land layout, urban planning guidelines and road networks.

2019 also saw the commencement of the study on optimising the Taipa-Coloane Causeway (Cotai Strip), with a report on results of the first-stage study submitted by a research unit, focusing on the overall planning of road service levels, commuter flows within the area, crossing facilities, pedestrian spaces and scenic design of the Cotai Strip, and advising on the plan for optimising the Taipa-Coloane Causeway region.

Planning Condition Drafts

Urban planning conditions for districts lacking detailed planning are being compiled by the DSSOPT in accordance with the Urban Planning Law and the Rules for the Implementation of the Urban Planning Law. During 2019, 134 sets of planning conditions for urbanisation management were issued.

Construction Companies and Contractors

According to DSSOPT statistics, a total of 1,523 construction contractors and companies had registered or renewed their registrations by the end of 2019. With Law No.1/2015 – “Qualification System for Urban Construction and Town Planning” – coming into effect, the DSSOPT added data on categories and registrations of urban construction and town-planning companies. Details are as follows:

Category		New registration	Renewed registration	Total
Companies (urban construction)	Construction	110	976	1,086
	Fire	6	73	79
	Sub-total	116	1,049	1,165
Companies (urban construction and urban planning)	Construction	22	108	130
	Fire	0	11	11
	Sub-total	22	119	141
Companies (gas)		3	34	37
Construction contractors (urban construction)		9	171	180
	Total	150	1,373	1,523

Technicians

Technicians, including engineers and architects, are categorised according to their professions in the above-mentioned law. By the end of 2019, over 1,181 technicians in 11 construction related professions had registered or renewed their registrations, with details as follows:

Category		New registration	Renewed registration	Total
Technicians (construction and urban planning)	Architects	2	232	234
	Landscape Architects	0	3	3
	Civil Engineers	9	515	524
	Fire Engineers	1	7	8
	Electrical Engineers	9	98	107
	Electrical and Mechanical Engineers	2	168	170
	Mechanical Engineers	2	110	112
	Chemical Engineers	2	7	9
	Industrial Engineers	0	1	1
	Fuel Engineers	0	2	2
	Engineering Technicians	0	11	11
	Total	27	1,154	1,181

Infrastructure Projects

Private Construction Projects

According to statistics from the Lands, Public Works and Transport Bureau, in 2019, 39 building projects providing 2,886 residential flats with a total floor area of 297,603 square metres, 106 commercial units with a total floor area of 28,363 square metres, one office unit with a floor area of 296 square metres, and 4,109 parking spaces (2,027 for private cars and 2,082 for motorcycles) in car parks with a total area of 94,531 square metres were completed. No industrial/warehouse unit was completed during the year.

During 2019, construction commenced on 27 private projects providing 342 units with a total floor area of 35,781 square metres, 46 commercial units with a total floor area of 5,210 square metres, and 97 parking spaces (83 for private cars and 14 for motorcycles) in car parks with a total area of 3,931 square metres. No office unit or industrial/warehouse project commenced during the year.

By the end of 2019, 5,589 units were under construction, of which 5,274 were residential units with a total floor area of 434,992 square metres, 295 were commercial units with a total floor area

of 39,816 square metres, 20 were office units with a total floor area of 6,480 square metres; as well as 3,951 parking spaces (3,020 for private cars and 3,931 for motorcycles) in car parks, with a total area of 124,632 square metres.

During the year, a total of 9,924 units were still in the design phase, of which 9,039 were residential units with a total floor area of 710,498 square metres, 858 were commercial units with a total floor area of 191,145 square metres, 22 were office units with a total floor area of 8,419 square metres, and five were industrial warehouses with a total floor area of 30,227 square metres; as well as 8,620 parking spaces (6,273 for private cars and 2,347 for motorcycles) in car parks, with a total area of 269,683 square metres.

In 2019, 8,246 applications were received for private construction projects, of which 2,119 applications were for demolition/maintenance/renovation, 1,910 were for simple projects in common parts of buildings, food and beverage establishment integrated construction projects, and construction licences, and 746 were for construction/expansion. During the year, 8,051 applications from 2019 and the previous year were handled, a majority of which were in the above-mentioned three major categories: 1,979 applications for demolition/maintenance/renovation projects, 1,896 applications for simple projects in common parts of buildings/integrated construction projects for food and beverage establishments/construction licences, and 755 applications for construction/expansion projects.

Public Construction and Infrastructure Projects

To enhance the quality of various community facilities and government services, the Lands, Public Works and Transport Bureau followed up on a number of public works projects in 2019, with 70 projects commenced and 82 projects completed during the year.

Nine major projects require open tendering: renovation of Estrada Nordeste da Taipa and Rua de Choi Long public housing social service facilities – youth service complex and day centre for the elderly in the same land lot; renovation of Fai Chi Kei Lots E & F public housing social service facilities; construction of a temporary Ilha Verde Fire Station; renovation of Portos do Entendimento; renovation of Estrada de D. Maria II Post Office Building; renovation of Economic Services Bureau; renovation of the office of the Industrial and Commercial Development Fund of Macao on Rua de S. Domingos and maintenance of the Meteorological and Geophysical Bureau office building. There were also three major quotation invitations and tendering projects, for the construction of the Public Prosecutions Office (Phase 2), new Macao Prison – Phase 3 works, and reconstruction of the office of the Macao Security Forces Shooting Range in Coloane.

There were 57 projects costing less than 2.5 million patacas, including one involving the demolition of dangerous old buildings, and 10 involving the demolition of illegal structures; and 13 projects costing more than 2.5 million patacas.

Major projects completed in 2019 included 82 that commenced in previous years: one from 2015, two from 2016 and 2017 each, 20 from 2018, and 57 from 2019. The major completed projects included:

- New Macao Prison – Phase 2 works that commenced in 2015;

- Construction of Public Prosecution Office (Phase 1) and the new headquarters of the police dog team of the Police Tactical Unit that commenced in 2016;
- Construction of facilities of the Customs at Rotunda Tenente Pedro Joss da Silva Loureiro and design and construction of the Complex for Commercial and Trade Cooperation Services Between China and Portuguese-speaking Countries that commenced in 2017;
- Renovation of the office of Coloane Islands Police Department on Taipa Island (Pac On) that commenced in 2018;
- Renovation and maintenance of the office building of the Marine Enforcement Department of the Macao Customs in Ilha Verde that commenced in 2018;
- Renovation of the building façade and waterproof roofing of the Fire Service Sai Van Lake Station that commenced in 2018;
- Renovation of the office floors of the Economic Services Bureau and the Legal and Judicial Training Centre, both of which are in the Luso International Banking Building, that commenced in 2018; and
- Renovation of Estrada Nordeste da Taipa and Rua de Choi Long public housing social service facilities – youth service complex and day centre for the elderly that commenced and was completed in 2019.

In 2019, work commenced on five planned projects:

- Renovation of the office of China-PSCs Commercial and Trade Service Platform Complex;
- Renovation of Base Court;
- Construction of phase 2 of the community services complex at Rua da Praia do Manduco – modification and renovation;
- Renovation of the Protocol, Public Relations and External Affairs Office; and
- Renovation of units of Edifício do Bairro da Ilha Verde.

On the infrastructure front, the Government continued following up regarding the plan for flood prevention and drainage in the Macao peninsula and the Islands District, road network implementation, sewer improvements, cross-harbour bridges and slope monitoring and maintenance.

In 2019, two studies were completed, four studies commenced, four design projects were completed, eight design projects commenced, 43 construction projects were completed, and 40 constructions projects commenced. Five of these projects were relatively large-scale and involved public tendering.

To eliminate flood and drainage problems of Macao in the long run, the Lands, Public Works and Transport Bureau, having completed the Masterplan for Flood Prevention and Drainage at the Promenade of Inner Harbour of Macao, conducted the next-phase Feasibility Study on Sluices at the Inner Harbour of Macao: Engineering Investigations and Focus Study and the preliminary design of a tide gate in 2019. It also began drafting a plan for construction project following the completion of a study on a Flood Storage Pond for Rainwater at the Inner Harbour, and Improvement

of Drainage System cum Soil Investigation Services; and began the feasibility study on building a storage pond and a sewage pump station at the original site of Macao (Yat Yuen) Canidrome Club, to explore the feasibility of improving Inner Harbour drainage using a storage pond.

Beside Inner Harbour, other smaller districts also started flood prevention and drainage projects, including Improvement Works for Outer Harbour Dikes – Compilation of Project Plan, Flood Prevention Work along the Coast from Fai Chi Kei to Ilha Verde – Compilation of Project Plan, and the Report on the Overall Plan for Flood Prevention and Drainage at West Coloane, and the project to develop an Overall Plan for Flood Prevention and Drainage at the Outer Harbour.

The work on sewers, road transport networks, cross-harbour bridges and slopes mainly comprises:

1. Studies, including:

- Overall Plan for Flood Prevention and Drainage at West Coloane;
- Feasibility study on building a storage pond and a sewage pump station at the original site of Macao (Yat Yuen) Canidrome Club;
- Study on Flood Storage Pond for Rainwater at the Inner Harbour and Improvement of Drainage System; and
- Nobre de Carvalho Bridge – Preliminary Design, Engineering Investigations and Study on the Construction of Two Cross-harbour Tunnels.

2. Project plans, including:

- Construction of a cross-harbour tunnel in New Urban Zone Area A and Area B – preliminary design;
- Construction of infrastructure at New Urban Zone Area B East Wing;
- Flood storage pond for rainwater at the Inner Harbour and improvement of the drainage system;
- Construction of a pedestrian system around Guia Hill;
- Construction of a bridge connecting New Urban Reclamation Zone A and Macao Peninsula (A2);
- Construction of a new road near Avenida Marginal Flor de Lótus, Taipa; and
- Lift construction at the flyover on Avenida do Dr. Rodrigo Rodrigues.

3. Monitoring projects, including:

- Monitoring Structural Safety of Sai Van Bridge and Friendship Bridge; and
- Besides Taipa Grande, slope monitoring work was expanded to include installation of an automatic monitoring system at Mount Fortress slope.

4. Construction works, including:

- New roads near Avenida Marginal Flor de Lótus, Taipa;

- Road and sewer works neighbouring Seac Pai Van Reservoir;
- Road and pedestrian walk improvement work at Governador Nobre de Carvalho Avenue on Taipa island;
- Slope strengthening at Governador Nobre de Carvalho Avenue on Taipa island;
- Construction of the Skywalk at Avenida de Guimarães on Taipa;
- Maintenance of girders and bolster base of Friendship Bridge; and
- Construction of a footbridge near Macau Fisherman's Wharf on Amizade Avenue.

Infrastructure project	Number of projects commenced	Number of projects completed
Study	4	2
Design	8	4
Construction	4	43

Infrastructure Development Office

Established in 2000, the Infrastructure Development Office is responsible for fostering and coordinating the execution, maintenance, modernisation and development of major constructions projects implemented in the Macao SAR, as well as research, follow-up work and implementation of cooperative construction projects within the Greater Pearl River Delta region.

In October 2019, the Infrastructure Development Office took over projects that were originally handled by the former Transportation Infrastructure Office, and continued pushing forward with the development of the Light Rail Transit (LRT) System.

Hospitals

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 has been completed, while the work on the other construction projects is underway.

Road Infrastructure

Coloane-Ka Ho Tunnel

The Coloane-Ka Ho Tunnel project is being constructed in three parts: the tunnel section, south exterior section, and north linkage section. The project will connect Ka Ho and the east of Cotai, for convenient movements of residents and vehicles to and from the port, without having to make a detour via Estrada da Barragem de Ka Ho, Estrada de Nossa Senhora de Ka Ho, Estrada do Altinho de Ka Ho, or Taipa-Coloane Causeway. It can also reduce commuting times and ease the long-term traffic burden. At present, the construction of the tunnel section and south exterior section has been completed, with work progressing on the north linkage section.

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. The contracts for the construction work have been awarded, and related works are underway.

Public Housing Projects

To meet the people's housing needs, the Infrastructure Development Office has launched a number of public housing projects since 2007, including Taipa Lot TN27, public housing estates in Seac Pai Van, and redevelopment of public housing in Fai Chi Kei, Bairro da Ilha Verde Lot 1, 2 and 3. Construction of public housing that started in 2012 and 2013 at Northeast Road on Taipa, Rua de Choi Long, Fai Chi Kei Lots E, F, L4 and L5 has been completed.

Public housing projects that are underway include: second phase of the Mong Ha Public Housing project; Rua Central De Toi San Public Housing Estate; and Avenida de Venceslau of Morais Public Housing project. Moreover, the design and preliminary works of New Urban Zone Area A public housing phase 1 and of public housing project on Avenue Wai Long, Taipa, are underway.

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. Reclamation and dyke works of Area C and Area D are in progress.

Cross-border Cooperation Projects

New Guangdong-Macao Border Crossings

Construction of a new Guangdong-Macao border crossing is one of the Guangdong-Macao cooperation projects. It mainly includes construction of a new border checkpoint (Qingmau Checkpoint), a border crossing channel, and the Canal dos Patos improvement works

The topping out ceremony was held for Qingmu Checkpoint building on the Macao side at the end of 2019. Work is in progress on the checkpoint building on the Zhuhai side, the crossing tunnel and the Canal dos Patos improvements.

LRT Project

The LRT Taipa line commenced operations in 2019. Construction of the Taipa line linkages to Macao peninsula and Barra Station as well as Seac Pai Van line works is underway.

Macao Light Rapid Transit Corporation Limited

The Government has established the Macao Light Rapid Transit Corporation Limited in accordance with By-law No.8/2019. Macao Light Rapid Transit Corporation Limited is mainly responsible for building and maintaining the infrastructure and equipment necessary for the operations of the light rapid transit system, as well as operating the transit system, including operations management and provision of passenger services. Other extended services include advertising and commercial services. The company is committed to building and providing high-quality, safe, reliable and barrier-free modernised light rapid transit services for both Macao citizens and inbound tourists, with a view to making the transit system a widely popular and recognised public means of transport in Macao, in line with the Government's public transportation policy, thereby elevating citizens' quality of life and convenience in commuting.

The Macao LRT Taipa line is 9.3 kilometres long, with 11 stations, covering the major residential areas, old districts and tourist spots of downtown Taipa, and linking Macao's three major ports of entry by sea, land and air. The Taipa line officially commenced operations in December 2019.

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 prioritise the allocation of public rental housing resources, with priority to be given to low-income families; provide technical support for strata-title buildings management; monitor the real estate agency business; and issue the related licenses 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.

Under Law No. 10/2011 - "The Home-Ownership Scheme Housing Law" amended by Law No. 11/2015, 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.

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 2019, a total of 1,814 family applicants were allocated housing units.

The process of allocating 1,544 one-bedroom Home-Ownership Scheme housing units of Ip Heng Building to those who submitted general applications began in early 2013. As housing units open for application were all sold, the applicant priority list for this application period expired.

In accordance with the Home-Ownership Scheme Housing Law, general application for 3,011 multi-room housing units began at the end of November 2019, and closed by end of March 2020.

Public Housing

Public housing refers to units leased by the Government to low-income families and those in adverse circumstances. Methods for the allocation and management of public housing are governed by By-law No. 25/2009.

Public housing is distributed to families of weak financial standing in the form of leasing. Families of weak financial standing are defined as those whose household incomes fall beneath

the legally stipulated levels.

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 on 13 February 2019, covering 6,349 households. As at December 2019, 1,239 households had been allocated housing, and 627 households gave up their applications or were delisted.

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 2019, the bureau handled 4,537 cases of Home-Ownership Scheme management-related affairs, fostered 74 management organs of Home-Ownership Scheme housing that are already in place and operating effectively, and handled 3,071 cases involving convention of owners of strata-title buildings under the Home-Ownership Scheme and affairs regarding the operations of management organs. There were 4,604 cases of assistance provided for the management of private housing common areas.

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 2019, a total of 82 licences and 189 temporary licences for commercial management of strata-title buildings had been issued. Applications for licences of strata-title building management and the related monitoring and supervision are handled by the Housing Bureau.

Seven Schemes Under 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, removing illegal structures within and establishing management organs of the common areas of private housing.

In 2019, 327 applications for the seven schemes under the Property Maintenance Fund were approved, with subsidies totalling over 30.83 million patacas. A total of 4,126 applications have been approved since the establishment of the fund, granting subsidies totalling 413 million patacas.

Joint Centre for Building Leakage Issues

Through cross-departmental cooperation among the Lands, Public Works and Transport Bureau, Municipal Affairs Bureau, Health Bureau, Legal Affairs Bureau and Housing Bureau, the Government established the Joint Centre for Building Leakage Issues on 1 February 2009. The centre provides one-stop assistance to owners of flats that are origins of leaks to encourage maintenance. In 2019, 1,441 cases were filed for investigations; and there was follow up work on 2,561 cases*, 1,811 of which were completed**.

**Total number of new and old cases pending processing to date*

*** Total number of cases completed in 2019*

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 2019, five squatter dwellings were demolished. By the year-end, 442 squatter dwellings remained, of which 190 were on the Macao peninsula and 252 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

By December 2019, the numbers of licences issued for real estate agents and brokers totalled 2,161 and 7,608, respectively.

Supervision

To facilitate the implementation of laws and various tasks, during 2019 about 1,998 inspections were conducted in business premises of real estate agents, and about 61 inspections were conducted at strata-title buildings, to check the compliance with the Real Estate Agency Law and Strata-title Buildings Management Commercial Operation Law among real estate agencies and strata-title building management companies, and to initiate disciplinary proceedings against alleged

administrative irregularities. Complaints about real estate agents, brokers and strata-title building management company owners were received and handled in accordance with the relevant laws. During 2019, 33 cases involving real estate agents, two cases involving real estate brokers, and one case involving strata-title building management company owners resulted in penalties for breaking the law.

Land Management

Lands Committee

The Lands Committee is a consultative body whose work is supervised by the Secretary for Transport and Public Works. The committee is responsible for advising on land use by recipients of land grants, in terms of legal and contractual obligations. It also advises on fines or other penalties for land grant recipients who fail to comply with the laws and terms of their contracts; cases concerning the public use of granted land; and granting, renewing, renouncing or cancelling temporary land-occupation licenses.

Land Concessions

According to the DSSOPT's statistics, 23 land grant contracts were completed and seven orders of land return were issued in 2019. These contracts were as follows:

1. Leases and grants: A total of nine contracts, with return of 45 square metres of land and no newly granted area, involving a total floor area of 1,904 square metres.
2. Long-term leases: There were 12 contracts in total, with newly granted land of 90 square metres, and return of 81 square metres of land, involving a total floor area of 3,839 square metres.
3. Special purpose concessions: a total of two, with newly granted land of 2,935 square metres and no return of land, involving a total floor area of 2,935 square metres.
4. Returned land: seven contracts in total, including four annulled contracts, involving a return of land of 11,356 square metres.

The land granted in 2019 was mainly for residential, commercial, industrial, office, hotel, car parking and other development uses. No land was granted for social facility related projects. The premiums under land grant contracts in 2019 totalled 202,082,069 patacas. Income from land premiums during the year totalled 80,562,017 patacas. There was no record of overdue payments during the year.

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 Lands, Public Works and Transport Bureau, the transition period prescribed in Law No.1/2015 has already finished. Now application for accreditation and registration is only open to those who have completed field training and passed qualifying examinations.

During 2019, three people were approved for professional registration after second review; they were from architecture, mechanical engineering and environmental engineering disciplines. As a result, since the enforcement of the law till the end of 2019, accredited professionals in the 13 disciplines totalled 2,547, with the breakdown as follows:

Professions	Numbers of registered professionals (2019)	Numbers of registered professionals (2015-2019)
Civil Engineering	0	1,016
Architecture	1	408
Electrical and Mechanical Engineering	0	308
Electrical Engineering	1	310
Mechanical Engineering	0	275
Environmental Engineering	1	91
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	3	2,547

In 2019, a total of 136 practitioners of various professional disciplines received council approval to join internships. At the end of 2019, the number of practitioners since the law came into effect was over 410, with details as follows:

Professional Discipline	Number of Interns (2019)	Number of Interns (2015-2019)
Civil Engineering	77	241
Architecture	20	68

(Cont.)

Professional Discipline	Number of Interns (2019)	Number of Interns (2015-2019)
Electrical and Mechanical Engineering	20	56
Electrical Engineering	14	27
Mechanical Engineering	2	11
Environmental Engineering	1	5
Urban Planning	1	1
Fire Engineering	0	1
Landscape architecture	1	2
Total	136	412

In 2019, a total of 83 practitioners of various professional disciplines received council approval to register themselves as internship instructors. At the end of 2019, the number of instructors since the law came into effect was 470, with details as follows:

Professional Discipline	Number of internship instructors (2019)	Number of internship instructors (2015-2019)
Civil Engineering	34	212
Architecture	9	97
Electrical and Mechanical Engineering	13	70
Electrical Engineering	15	38
Mechanical Engineering	7	33
Environmental Engineering	2	8
Urban Planning	2	5
Fire Engineering	1	4
Landscape architecture	0	1
Fuel Engineering	0	2
	34	212
Total	83	470

In 2019 a total of 96 practitioners of various professional disciplines were eligible for qualifying examinations. At the end of 2019, the total number since the law came into effect was 100, with details as follows:

Professional Discipline	Number of practitioners eligible for qualifying examinations (2019)	Number of practitioners eligible for qualifying examinations (2015-2019)
Civil Engineering	61	63
Architecture	18	20
Electrical and Mechanical Engineering	10	10
Electrical Engineering	6	6
Mechanical Engineering	1	1
Total	96	100

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 first round of qualifying examinations was held on 14 December and 15 December 2019, with a total of 89 candidates from five professional disciplines: civil engineering, architecture, electrical and mechanical engineering, electrical engineering and mechanical engineering. The examinations cover knowledge tests, as well as solution designs or case analyses. Those who pass the written test are eligible to sit for the second-phase, professional face-to-face 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 2019, the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area was announced, setting the overall direction of Guangdong-Hong Kong-Macao Greater Bay Area development.

As a key consultative organisation for Macao’s urban planning, in March and May the Urban Planning Committee paid exchange visits to Greater Bay Area cities including Guangzhou, Dongguan, Huizhou, Shenzhen, Zhongshan, Jiangmen, Foshan and Zhaoqing. The committee conducted exchange seminars with relevant professionals regarding overall planning concepts, current profiles of urban planning and industrial development and land reuse for Greater Bay Area

development. It also visited local city planning projects.

Through exchanges and observations, the committee obtained a greater understanding of the current development and urban planning of these cities, as well as the development vision of Greater Bay Area planning, thereby making a good start for the concerned efforts.

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.

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. Pursuant to Executive Order No. 234/2018, nine members were appointed to the Committee for tenure of three years.

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 2019									
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	93907.41	106011.73	62276.38	17478.91	16772	11724	182	25	24
Taipa	27922.02	60109.92	376.42	26609.31	5174	3570	77	1	22
Coloane	11103.26	28314.95	0	14831.29	1696	1493	63	0	11
Total	132932.69	194436.6	62652.80	58919.51	23642	16787	322	26	57

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 2019, the Drainage Division received 37 complaints regarding street flooding caused by rainstorms, along with 338 complaints about silting of main drains. There were 42 prosecutions concerning violation of the General Regulations Governing Public Places, and 172 subpoenas were issued to alleged 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 priority areas for strengthening and maintenance. Regarding private slopes, the DSSOPT would require the respective property owners to implement timely measures in accordance with the advice of the slope safety task force.

At present, the slope safety task force mainly comprises engineers from the DSSOPT, the Municipal Affairs Bureau and the Macao Civil Engineering Laboratory.

Number of slopes / risk	High	Medium	Low	Total
Macao peninsula	0	34	79	113
Taipa island	0	25	41	66
Coloane island	1	14	53	68
Total	1	73	173	247

According to the Lands, Public Works and Transport Bureau, as of the end of 2019, Macao had 247 hazardous slopes on record, with the DSSOPT and Municipal Affairs Bureau responsible for the road and public park slope maintenance works, respectively. In 2019, the DSSOPT supervised three slope maintenance and improvement projects.

In 2014, the DSSOPT began setting up an automatic slope monitoring system at Taipa Grande. The system has already been operational for about five years, effectively providing real-time monitoring and collecting slope data. The real-time data on slope dislocation, subsidence and cracks is sent to the Macao Civil Engineering Laboratory and the DSSOPT, enabling early precautionary measures and alerts.

In 2019, the second monitoring system in Macao was set up at Mount Fortress slope. This is expected to start operations in 2020, after completion of the installation and testing.

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.

The Cadastre Division also provides survey information from its database to land owners 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, printed aerial survey 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

The Cartography and Cadastre Bureau opened three Global Positioning System (GPS) reference stations – at Mount Fortress, Alto de Coloane and Taipa Grande on Taipa island in 2002, 2005 and 2008, respectively. The reference stations can receive both GPS signals as well as data from the Russian GLONASS system (Global Navigation Satellite System) and effectively cover the whole of Macao, further enhancing land, cadastral and engineering surveys of Macao, as well as data collection for the Geographic Information System (GIS).

In 2009, the Macao Satellite Positioning Reference Station Service (mosref.dsc.gov.mo) was launched, making satellite reference data officially available to the public, through registration. In addition, an NTRIP (Networked Transport of RTCM via Internet Protocol) service was 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 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 2019, the website had received over 1.2 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. Users can search for 50 kinds of useful information in 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.

To accord with the Government's policy to create an accessible environment, nine walking routes were included in the Macao Online Map, providing information on recommended walking routes and time required. Since its launch in 2001 till the end of 2019, the online map has received more than 6.5 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 (Apps). 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.

There is also a personal computer version of Macao Map. Apart from viewing a map and searching for locations, users of this version can also search for the shortest route using the electronic road maps, which are free for citizens and tourists to download.

In 2014, the Cartography and Cadastre Bureau introduced the Macao Street Number Inquiry System (webmap.gis.gov.mo/AddressSearch/chn) based on the Macao Online Map, which provides a street number inquiry service with a simple operating interface.

GeoGuide for Emergency is a mobile geographical app launched by the Cartography and Cadastre Bureau with the support of the Unitary Police Service, the Meteorological and Geophysical Bureau (SMG), the Office for the Development of the Energy Sector (GDSE), the Marine and Water Bureau, Education and Youth Affairs Bureau (DSEJ) and the Social Welfare Bureau. In 2019 an updated version was launched, providing the public with alerts about regions that may be affected during all levels of storm surge, as well as areas that are expected to be affected by suspension of power, real-time alerts about bad weather, emergency shelter locations and emergency telephone numbers in Macao, via mobile phones.

The Traffic and Geographic Information Web (traffic.gis.gov.mo) is a cooperative project between the Cartography and Cadastre Bureau and the Transport Bureau, providing locations of roadworks in progress or to soon commence, and related traffic diversions in Macao.

The Environmental Geographic Information System (gis.dspa.gov.mo) was jointly created by the Environmental Protection Bureau and the Cartography and Cadastre Bureau for the provision of shared map service. The system publishes environmental data and related processed information through the Internet.

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.

Office for the Development of the Energy Sector

The Office for the Development of the Energy Sector (GDSE) was established on 1 January 2005 under Executive Order No. 11/2005, and is under the supervision of the Secretary for Transport and Public Works. Its purpose is to promote and coordinate all activities related to the energy sector, and thus help to implement the Government's energy policy. The office's major functions are to assist the Government in formulating policies for the energy sector; formulate development plans and related laws and regulations, and follow up on and monitor their implementation; coordinate, promote the study of and monitor the efficiency, impacts on the environment, prices and services, and technical regulations of energy products.

Electric Power

In 2019, Macao continued to strengthen regional cooperation in the electric power industry, and took the initiative to foster development of power supplies. Regarding the third circuit of the 220kV Macao-Zhuhai electric power transmission channel, installation of cables of the electricity network was 78 percent completed by the end of 2019, and is targeted for completion as soon as possible, to meet needs until 2025.

2019 saw the completion of the tender evaluation and relevant investment budget approval for the initiative to generate electricity using natural gas, and it is expected that construction of the new power plant can be completed in about 25 months, upon confirmation of the land use right. It is expected to achieve 30 percent of local electricity generation – and up to 50 percent at times of emergencies, upon successful completion and commencement of operation of the plant, in order to ensure electricity supplies at key facilities such as hospitals, communications facilities and water supply systems, as well as most residential areas.

To support the power demand of residents in old districts, in Macao six outdoor transmission facilities were installed in several of these districts. In future, the Government will continue identifying appropriate locations in old districts for installation of outdoor transmission facilities. The Government is also working with the Municipal Affairs Bureau to proceed with the joint

construction of four landfills and substations, in order to tackle the land space issue. At present, three joint landfill construction projects are undergoing layout approval.

As regards preventing and responding to disasters, the Government followed up on the comments and recommendations of the National Commission for Disaster Reduction's Expert Group. As a result, to ensure external power supplies, China Southern Power Grid enhanced the wind resistance of its power grid, and finished reforming the Hengqin Thermal Power Station as a complementary source of power from mainland China for Macao, to further raise the reliability of external power supplies. Moreover, as regards the enhancement of transmission networks in low-lying areas, over 150 substations were improved in 2019.

In 2019, to lower burdens on residents, the Government continued to offer the electricity fee subsidy of 200 patacas per month per household.

Natural Gas

Following the completion of the natural gas pipeline network in Cotai, the construction of the natural gas pipeline network was gradually extended to the Macao Peninsula. In 2019, the Government continued coordinating the efforts of franchise companies and relevant government departments to confirm the location of valve stations at the two ends of Macao-Taipa cross-harbour gas supply pipeline, as well as the pipeline routes, thereby launching the related design project prior to the new gas supply to the Macao Peninsula.

The Government continued coordinating efforts regarding the land grant procedures, and the project on geological quality, required for the liquefied natural gas emergency storage and distribution station, so that the franchisee might commence the construction works as soon as possible. The Government is also coordinating efforts to expedite site selection for the natural gas filling station, to support the expanded application of natural gas buses. Moreover, 2019 saw the completion of two emergency gas sources for the natural gas distribution network – from Hengqin to the University of Macau and from Gongbei to Ilha Verde, further safeguarding the natural gas supply.

On 23 August 2019, the Government signed a concession contract with Companhia de Electricidade de Macau (CEM) regarding the public service of Government common pipeline management, assigning the planning and construction works of the common pipeline to the Government, and requiring the franchisee to provide management services to users of the common pipeline.

Energy Efficiency and Conservation

Since the launch of the initiative to install light-vehicle charging spaces at public carparks in 2016, a total of 170 light-vehicle charging spaces had been installed in Macao by the end of 2019, spanning 35 public carparks and five public roads, providing a free charging service to citizens. An additional 30 planned charging spaces are being installed, with a view to achieving 200 public charging spaces, as specified in the five-year plan of the Macao SAR.

As regards promotion of energy-saving LED lights, the Government plans to replace all street lights in Macao with LED lights, to save energy and for aesthetic enhancement and safety. By the

end of 2019, LED street lights already accounted for about 40 percent of Macao's street lights.

The Office for the Development of the Energy Sector (GDSE) continued organising large-scale publicity programmes, such as the Macao Energy Saving Week, the Energy Efficiency Educational Programme, and the Campus Energy Conservation Culture Programme, in order to promote energy saving.

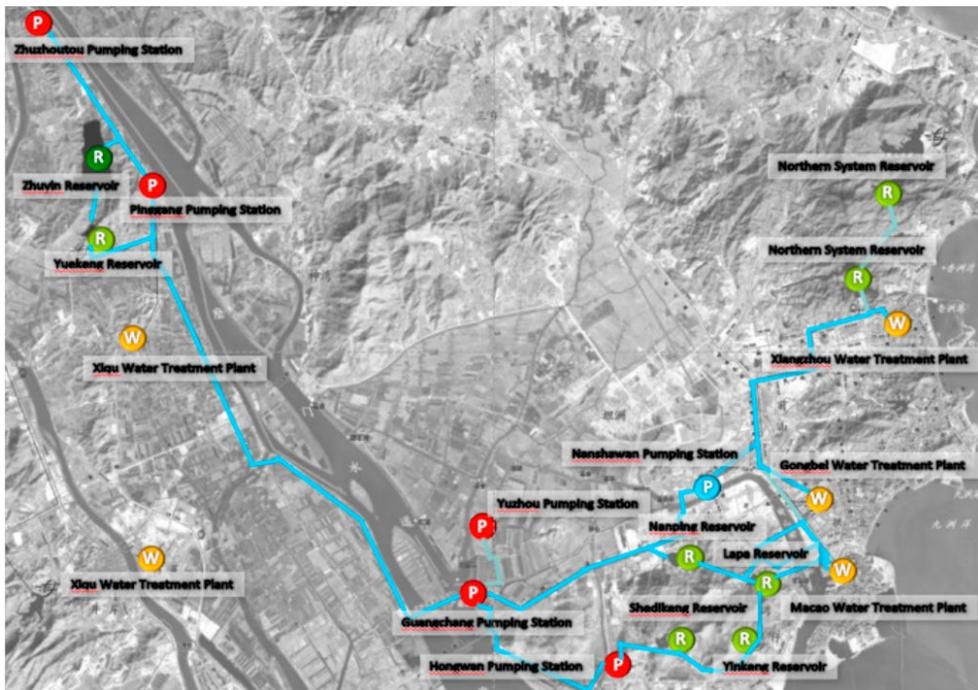
Drinking Water

Macao Water Supply Company (or “Macao Water”)

The Macao Water Supply Company (Macao Water) was established in 1935, and is privately owned. SUEZ NWS Limited, formerly known as Sino-French Holdings (Hong Kong), which is a joint venture between the French-based Suez Lyonnaise des Eaux Group and NWS Holdings, acquired 85 percent of the company's shares in 1985, and signed a 25-year water-supply concession contract with the former Portuguese administration. 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 three major water inlets and two reserve water inlets for Macao's raw water intake. Some 95 percent or more of Macao's raw water comes from Xijiang (West River). In the past ten years, to mitigate salinity effects, the raw water intakes located at Modaomen, Zhuhai, have been moved over 20 kilometres upstream.

The green labels identify reservoirs. Recently, to mitigate salinity effects, the Zhuyin Reservoir was built in Pinggang with a total volume of 43 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.

In 2019, Zhuhai currently supplies about 279,000 cubic metres of water to Macao each day, a total of 101.72 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 390,000 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 76,000 cubic metres. In 2019, the total length of main pipelines was 622 kilometres.

At the end of 2019, 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 1.91 million cubic metres, including 1.66 million cubic metres in the reservoir near the Outer Harbour.

A total of 100.64 million cubic metres of water were supplied in 2019, 0.2 percent more than in 2018. The daily average volume supplied in 2019 was around 276,000 cubic metres, with a maximum of 309,000 cubic metres recorded on 4 October. In 2019, the total capacity of water sales was 92.81 million cubic metres, with a daily average of 254,000 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 mobile site, QR codes in water bills, electronic billing, a safe email box co-established with the Macao Post and Telecommunications Bureau, Little Water Steward mobile app and official WeChat account, which allows 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 facilitate closer liaison with customers, and to better understand customers' views regarding water supply services in Macao.

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 2019, Macao Water had 260,179 customer accounts, including 228,333 households, 29,500 companies and 2,346 Government institutions.

Supporting Sustainable Development

As a public enterprise, Macao Water has taken up the social responsibility of caring, environment protection and sustainable development. From 2011, Macao Water publishes a sustainable development report that is in line with international standards. The 2018 report was written according to the requirements of G4 Guidelines of the Global Reporting Initiative, and was awarded the "Services Institution with Verified Disclosure" logo.

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 OHSAS 18001 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 Macau 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 and 2015. As a result, there are six 220 kV power cables with a transmission capacity of 2,100 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 EDP Asia 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 2019, CEM's capacity peaked at 1,062 MW on 19 July, 9.4 percent higher than the peak capacity in 2018.

The Macao electricity transmission network comprises 26 primary substations, eight high-voltage substations and 1,007.7 kilometres of 66 kV high-voltage cables, 110 kV cables and 220 kV cables. The Guangdong-Macao electricity network included two 110 kV cables and two 220 kV cables. The 110 kV cables were connected to Gongbei Substation and Nanping Substation, while the 220 kV cables were connected to Zhuhai Substation and Qinyun Substation.

The 11 kV medium-voltage electricity transmission network comprises 1,514 user transformer rooms (11 kV/400 V) and 44 mid-voltage substations, and is connected by cables with a total length of 2,352 kilometres. The low-voltage transmission network comprises 922 kilometres of cable, while the street lighting network comprises 577 kilometres of cable and 11,303 streetlights.

CEM's power network is almost entirely comprised of underground cables.

Electricity Output and Consumption

CEM generated 613 GWh of electricity during 2019, an increase of 29 percent over 2018. The amount of electricity imported from mainland China was 4,976 GWh, an increase of 1.3 percent over 2018, accounting for 86.3 percent of total electricity consumption; and electricity purchased from the Macao Central Incineration Centre totalled 175 GWh. CEM's sales for 2019 totalled 5,546 GWh.

Customer Services

CEM established the CEM Customer Liaison Committee in 2000. With its 27 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 2019, CEM was providing services to 268,022 households. The Macao peninsula accounted for 80.63 percent of the total customer base; Taipa, 13.95 percent; Coloane, 5.36 percent; Cotai, 0.01 percent; and Hengqin, 0.05 percent.



Taipa Grande inclined elevator



The Taipa Grande inclined elevator is the first inclined elevator introduced in Macao, which commenced operation in October 2017.

The elevator is constructed between Lakeside Garden and the walkway of Taipa Houses-Museum, which connects with the elevated trail and the footbridge in-use.

The elevator opens from 7 a.m. to 8 p.m. for public use.

