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**LAND, INFRASTRUCTURE, HOUSING AND PUBLIC UTILITIES**



## **Land, Infrastructure, Housing and Public Utilities**

### **Urban Planning**

To achieve the long-term goal of sustainable development, urban planning that effectively allocates urban space and resources is crucial for optimising city construction, coordinating management and establishing development blueprints. With the enforcement of the Urban Planning Law, opportunities arising from the “Belt and Road” initiative, the five-year plan for developing a World Centre of Tourism and Leisure, and regional integration with neighbouring cities – which all create favourable conditions for diverse development – Macao may deepen its role as a regional platform with global reach. Integrated planning that aims to build a liveable city raises the level of comprehensive development of Macao.

### **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.

The Government completed its urban development strategy in 2016, and the tendering process for projects in overall urban planning commenced before the end of the year. The transport and public works plans will be implemented according to the development strategy policies and guideline, targets for promoting Macao’s economic diversification and regional cooperation, and the goal to develop Macao as a world tourism and leisure centre and platform for business and trade services between China and Portuguese-speaking countries.

During the year, the Government continued following up regarding various plans for smaller areas, including a study on the Macao Eastern District Coordinated Development Plan, which began in 2016, with the aim of integrating and coordinating construction and planning of the Areis Preta New Reclamation Zone (NATAP), the NAPE and the reservoir’s peripheral areas, New Urban Zone Area A and Zhuhai-Macao Port Artificial Island. Eventually, New Urban Zone Area A will be connected to the eastern district of Macao Peninsula, and is expected to provide about 32,000 residential units, 28,000 of which will be public housing units.

Preparatory work has also commenced on planning construction of the infrastructure for the administration and judicial zone in Area B. This includes the construction of seven buildings: the Courts of Final Appeal, Second Instance and First Instance; and offices for the Macao Prosecutions Office, the Commission Against Corruption, the Commission of Audit, and the Unitary Police Services. The Government will expedite and follow up regarding progress with construction in the administration and judicial zone, to fully utilise land resources.

Also in 2016, more detailed plans for New Urban Zone E1 were drawn up on schedule. The planning mainly focused on finalising the actual locations of transport networks and infrastructure facilities on the Macao peninsula and the Islands District, along with land use details, in order to optimise the seamless connectivity of sea, land and air transportation.

Urban planning conditions are issued by the DSSOPT in accordance with the Urban Planning

Law. During the year, 233 sets of planning conditions for urbanisation management were issued.

## Construction Companies and Contractors

According to DSSOPT statistics, a total of 1, 210 construction contractors and companies had registered or renewed their registrations by the end of 2016. 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
<b>Construction Contractors</b>		11	172	183
<b>Companies (construction)</b>	Construction	85	740	825
	Fire	3	64	67
	Sub-total	88	804	892
<b>Companies (construction and urban planning)</b>	Construction	9	88	97
	Fire	0	6	6
	Sub-total	9	94	103
<b>Companies (gas)</b>		4	28	32
	<b>Total</b>	<b>112</b>	<b>1,098</b>	<b>1,210</b>

## Technicians

Technicians, including engineers and architects, are categorised according to their professions and the above-mentioned law. By the end of 2016, over 1,220 technicians had registered or renewed their registrations, with details as follows:

Category		New registration	Renewed registration	Total
Technicians (construction and urban planning)	Architects	8	249	257
	Landscape Architects	3	3	6
	Civil Engineers	26	511	537
	Fire Engineers	0	5	5
	Electrical Engineers	5	94	99

(Cont.)

Category		New registration	Renewed registration	Total
Technicians (construction and urban planning)	Electrical and Mechanical Engineers	9	160	169
	Mechanical Engineers	7	114	121
	Chemical Engineers	5	2	7
	Industrial Engineers	0	1	1
	Fuel Engineers	0	1	1
	Engineering Technicians	0	22	22
	<b>Total</b>	<b>63</b>	<b>1,162</b>	<b>1,225</b>

## Infrastructure Development Office

The Infrastructure Development Office is responsible for facilitating and coordinating the execution, maintenance, modernisation and development of major construction projects in Macao. It also researches, follows up and develops cooperative construction projects with the Greater Pearl River Delta region.

Regarding public housing, the Infrastructure Development Office has commenced several public housing projects in recent years. Construction of the public housing estates in Seac Pai Van and Taipa Lot TN27 has been completed and residents have moved in.

Projects	No. of residential units	Other facilities
Seac Pai Van Public Housing Estate	8,649	Car park, social facilities
Edificio do Lago, Taipa	2,703	Car parking spaces, motorcycle parking spaces, public transport interchange, dry markets and social facilities
Fai Chi Kei Public Housing Estate	737	Public car park with car and motorcycle parking spaces
Rua Central De T'oi San Public Housing Estate	578	Public car park with a total of about 200 car and motorcycle parking spaces
Bairro da Ilha Verde Public Housing Estate, Lot 1, 2	2,356	Public car park with 1,190 car and 1,600 motorcycle parking spaces, bus interchange, commercial and social facilities

(Cont.)

Projects	No. of residential units	Other facilities
Bairro da Ilha Verde Public Housing Estate, Lot 3	770	Public car park with about 400 parking spaces, commercial and social facilities
Northeast Road, Taipa Public Housing Estate	694	290 car parking spaces, 310 motorcycle parking spaces, social facilities and recreation deck for residents
Fai Chi Kei Public Housing Estate, Lots E, F	436	Podium garden and social facilities located on the ground floor to 4th floor
Rua de Choi Long Taipa Public Housing Estate	288	Commercial facilities, public parking spaces and podium garden

## Hong Kong-Zhuhai-Macao Bridge

Formed in July 2010 by the Hong Kong Special Administrative Region Government, the People's Government of Guangdong Province and the Macao Special Administrative Region Government, and officially launched on 27 September 2010, the Hong Kong-Zhuhai-Macao Bridge Authority is responsible for organising and implementing the construction, operation, maintenance and management work of the main bridge. The Hong Kong-Zhuhai-Macao Bridge will feature a 29.6-kilometre, dual 3-lane carriageway. With a bridge-cum-tunnel structure, it will include an immersed tunnel that is about 6.7 kilometres in length and two artificial islands. Construction of the Hong Kong-Zhuhai-Macao Bridge will facilitate economic integration in the Pearl River Delta Region. Synergy of integration arising from construction of the bridge will foster industrial development in the Pearl River Delta region. Construction of the artificial island for the Zhuhai/Macao boundary crossing facilities commenced in late 2015.

## New Urban Reclamation

In line with Macao's future development and to increase land supply, in 2006 the Government reported to the Central People's Government about the land reclamation plan. After the new urban reclamation plan was approved by the Central People's Government in December 2009, the Government stepped up its efforts to carry out the reclamation work. The new urban reclamation area is divided into five areas, with a total area of about 350 hectares. It is expected to provide a land reserve for Macao for the coming 20 to 30 years. Area A is the biggest of the five subdivisions, covering an area of approximately 138 hectares. It is located to the east of Area Preta and Friendship Bridge on the Macao peninsula and north of the Outer Harbour watercourse of Macao. The reclamation work has commenced. It is planned that the area will be used for commercial and residential areas, infrastructure, a waterfront park, public/community facilities, and various industries.

The 33-hectare Area E1 is at the north-eastern tip of Taipa island, neighbouring Pac On Ferry Terminal, which is under construction, and the international airport. The area will be used for community facilities and transport infrastructure.

## **Construction of New Guangdong-Macao Border Crossings**

Under the Framework Agreement on Cooperation between Guangdong and Macao, to further promote regional cooperation, the new Guangdong-Macao border checkpoint will be used as an independent checkpoint, diverting passenger flows from the Border Gate. It is a closed-system checkpoint for passenger crossings only. According to the preliminary design, the number of boundary-crossing passengers will be around 200,000 to 250,000. It will help relieve the current pressure of passenger flows on the Gongbei Checkpoint. The new border crossing project is designed to include public transport hubs, ancillary facilities for commercial conferences and exhibitions, multi-storey car parks, a light railway station, community service facilities, business hotels, government office buildings and public housing estates. The first-phase of the new border checkpoint project – the construction of the new wholesale market – will be completed in the first quarter of 2017.

## **Coloane Ka-Ho Tunnel**

The Coloane Ka-Ho Tunnel project consists of three parts: the tunnel, the exterior south section and the 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. It can also substantially reduce commuting times and ease the long-term traffic burden.

## **Transportation Infrastructure Office**

On 1 November 2007, the Government established the Transportation Infrastructure Office, aiming to foster the modernisation and improvement of transportation infrastructure as well as the construction of the Macao Light Rail Transit (LRT) System, to provide comfortable and highly efficient modern transportation for citizens and tourists.

After years of planning and preparations, the civil construction works for Macao's LRT system began in 2012. The connections between the elevated railway of the 9.3-kilometre LRT Taipa line and the 11 LRT stations were essentially completed in 2016. The main structures of all stations were also completed, marking a new milestone for the LRT project. Construction of the depot superstructure was restarted in autumn 2016. The interior decorations, construction of overpasses of all stations, and the restoration work of roads along the railway route have also been expedited.

The next stage of the project will focus on commencing installation of the train system and preparing to make it operational – such as setting up an LRT company, starting legislative consultations on light rail transport, and working towards the goal of commencing operation of the LRT Taipa Line by 2019.

## Infrastructure Projects

### Private Construction Projects

According to statistics from the Lands, Public Works and Transport Bureau, 50 building projects providing 404 residential flats with a total floor area of 46,519 square metres, 86 commercial units with a total floor area of 14,226 square metres, one industrial/warehouse unit with a total floor area of 3,582 square metres, and 303 parking spaces in car parks with a total area of 10,364 square metres were completed in 2016. No office units were completed during the year.

During 2016, construction commenced on 49 private projects providing 1,973 units with a total floor area of 251,214 square metres, 120 commercial units with a total floor area of 19,079 square metres, five office units with a total floor area of 957 square metres, one industrial/warehouse unit with a total floor area of 6,470 square metres, and 2,232 parking spaces in car parks with a total area of 72,091 square metres.

By the end of 2016, 11,621 units were pending approval, of which 11,267 were residential units with a total floor area of 1,210,785 square metres, 340 were commercial units with a total floor area of 123,765 square metres, seven were office units with a total floor area of 2,879 square metres, and the remainder were industrial units with a total floor area of 67,189 square metres; as well as 11,249 parking spaces in car parks, with a total area of 373,305 square metres.

During the year, a total of 22,882 units were still in the design phase, of which 21,693 were residential units with a total floor area of 3,100,085 square metres, 1,147 were commercial units with a total floor area of 300,773 square metres, 37 were office units with a total floor area of 24,612 square metres, and the remainder were industrial units with a total floor area of 32,911 square metres; as well as 28,327 parking spaces in car parks, with a total area of 956,923 square metres.

In 2016, 7,723 applications were received for private construction projects, of which 872 applications were for construction/expansion, 1,693 were for demolition/maintenance/renovation, and 1,625 were for simple projects in common parts of buildings, food and beverage establishment integrated construction projects, and construction licences. During the year, 7,584 applications from 2016 and the previous year were handled, a majority of which were in the above major categories, including 852 applications for construction or expansion; 1,670 applications for removal, maintenance or renovation; and 1,662 applications for simple projects in common parts of buildings, integrated construction projects for food and beverage establishments, and construction licences.

### Public Construction and Infrastructure Projects

To improve social facilities, the DSSOPT followed up on a number of projects in 2016. During the year, 57 projects commenced and 33 projects were completed. The major constructions included replacement of the seaport passenger boarding bridge of the Outer Harbour Ferry Terminal, renovation of the warehouse outside the Macao Historical Archives, construction of the Financial Services Bureau warehouse in Ilha Verde, construction of the new headquarters of the police dog team of the Police Tactical Unit, reconstruction of the Coloane Island Station of Fire Services Bureau, and modifications to Tap Seac Square Commercial Centre.

Large-scale projects completed in 2016 included 33 that commenced in 2016, one that had continued from 2013, three that began in 2014, and 19 that began in 2015. The more prominent ones included contracted construction work for a community centre in Chun Su Mei, Taipa; the expansion of the Traffic Department of the Public Security Police; and the first-phase expansion of the Public Security Forces Affairs Bureau Building.

To support urban development, the commuting facilities for residents along with the infrastructure and ancillary facilities are consistently improving.

With regard to infrastructure, in 2016 the Government continued to follow up regarding road network and sewer improvement works, with 51 projects commencing and 29 projects completed. Open tenders were invited for 13 large-scale projects.

## **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 will fully implement the Government public housing policy “Public housing as the core, supplemented by the Home Ownership Scheme”; 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.

### **Eligibility for Home-Ownership Scheme Housing**

Residents wishing to purchase Home-Ownership Scheme Housing need to file applications with the Housing Bureau. Applicants must be at least 18 years old or be released from parental authority, and have lived in Macao for at least five years. In addition to a maximum permissible total income, there are strict regulations regarding family financial status. Applicants should not be owners or appointed buyers of any residential properties, independent units or land, or lessees of any private land.

Moreover, the following persons are not eligible for applying for Home-Ownership Scheme Housing: a member of another household which has purchased a Home-Ownership Scheme housing unit; a household or individual involved in a case in which the pre-sale contract of the Home-Ownership Scheme housing unit has been declared void or annulled within two years prior to the application; a household or individual whose application has been rejected due to false declarations or fraud within two years prior to the application; an individual whose name is in a household which is permitted by the Housing Bureau to purchase a Home-Ownership Scheme housing unit or has signed a pre-sale contract for a Home-Ownership Scheme housing unit; an individual whose name is in a household which is eligible for Home Acquisition or Renting Loan Subsidy; an applicant, appointed buyer, or spouse of owner of a Home-Ownership Scheme housing unit, appointed buyer and its household member who has been issued with an occupying permit for a Home-Ownership Scheme housing unit but gave up the purchase within five years prior to the application; and individual and his or her family member who have sold a Home-Ownership Scheme housing unit. An individual should not submit more than one application, including as a household member.

### **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. The assessment of the first 1,900 accepted applicants on the priority list was completed, and 839 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 in early 2013 is still in progress, with 1,460 of the applicants allocated housing units.

### **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.

## Requirements for Applications for Public Housing

Applications for public housing will open at a time deemed appropriate by the Housing Bureau. Households applying to lease public housing should fulfil the following requirements: the applicant should be aged at least 18, have resided in Macao for at least seven years, and be a holder of a Macao permanent resident identity card. The applicant and the members of the household should not be the owner or the appointed buyer of any buildings or independent units during the three years before the application, the owner or lessee of any private land, the member of another household which have purchased Home-Ownership Scheme housing, the member of another family that was granted housing through the regulations of the Home Acquisition or Renting Loan Subsidy Scheme and the Home Purchase Loan Subsidy Scheme, or the member of a family that has been punished for violating public housing regulations. In addition, the total monthly income and the total net assets of the household should not exceed the limit stipulated by law.

## The Upper Limit of Monthly Household Income and Total Net Assets

Under Executive Order No. 179/2012, which was amended in accordance with Executive Order No. 473/2015, the monthly household income and the total net assets of households applying for renting public housing should not exceed the amounts in the following table:

<b>Monthly Household Income and Total Net Assets *</b>		
<b>Household size (No. of family members)</b>	<b>Monthly household income (in Patacas)</b>	<b>Net assets (in Patacas)</b>
1	9,560	206,500
2	14,810	319,900
3	20,040	432,900
4	22,290	481,500
5	23,930	516,900
6	27,820	601,000
7 or above	29,460	636,400

\* with effect from 1 January 2016

## Granting of Public Housing

In 2016, the Housing Bureau issued invitation letters to families awaiting public housing according

to the order of the queue on the finalised waiting list, requesting submission of documents for detailed assessments. Arrangements were made for eligible families to sign rental contracts and move into their allotted units. The first-round letters were sent in autumn 2016.

### **Temporary Subsidies for Families on the Waiting List for Public Housing**

In the wake of economic inflation, in September 2016 the Government renewed the Subsidy Scheme for Families Awaiting Public Housing. A family awaiting public housing with a total monthly income not exceeding the statutory cap is eligible for one of the following: a monthly subsidy of 1,650 patacas for a family of one or two people; or a monthly subsidy of 2,500 patacas for a family of three or more people. From 2008 to 2016, 9,421 applications for the housing subsidies were approved, with the subsidies totalling about 400 million patacas.

### **Building Management**

According to the laws and regulations of the Home-Ownership Scheme, the Housing Bureau is empowered to monitor and supervise the operation of Home-Ownership Scheme Housing, including building maintenance and property management. In accordance with relevant laws, the bureau can also impose penalties on tenants or management entities that violate its regulations.

The Housing Bureau also assists owners of Home-Ownership Scheme Housing units with setting up management committees and resolving disputes about building management. During 2016, there were 66 such management committees, and 3,563 cases related to Home-Ownership Scheme Housing management, and 2,505 cases related to the convocation of the General Assembly of the owners and management committees were handled.

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.

A total of 1,976 cases involving technical support provided to the management of common parts of strata-title buildings were recorded in 2016.

### **Six Schemes Under the Building Maintenance Fund**

To encourage and help homeowners to perform their duties regarding maintenance of common building areas, the Housing Bureau established the Building Maintenance Fund in March 2007. Six schemes were included, to assist the homeowners with repairing and maintaining private housing, set-up management committees and remove illegal structures, by offering them subsidies or interest-free loans.

In 2016, there were 1,257 enquiries concerning the six schemes under the Building Maintenance Fund; 313 applications were approved, for subsidies totalling over 19 million patacas. A total of 3,189 applications have been approved since the establishment of the fund, granting subsidies totalling 320 million patacas.

## **Joint Centre for Building Leakage Issues**

Through cross-departmental cooperation among the Lands, Public Works and Transport Bureau, Civic and Municipal Affairs Bureau, Health Bureau, Legal Affairs Bureau and Housing Bureau, along with technical evaluations carried out by the Civil Engineering Laboratory, the Government established the Joint Centre for Building Leakage Issues on 1 February 2009. Led by the Housing Bureau, the centre provides a one-stop platform for offering assistance to residents. In 2016, 1,854 cases were filed for investigations; and there had been follow up work on 5,816 cases, of which 3,131 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 2016, 15 squatter dwellings were demolished. By the year-end, 460 squatter dwellings remained, of which 198 were on the Macao peninsula and 262 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 be licensed 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 2016, the numbers of provisional licences issued for real estate agents and brokers totalled 1,572 and 4,927, respectively; only 29 valid five-year provisional licences for real estate agents remained.

## **Supervision**

To facilitate the implementation of laws and various tasks, during 2016 about 3,200 inspections were conducted in business premises of real estate agents, to check their compliance with the Real Estate Agency Law and initiate proceedings against alleged administrative irregularities. In addition to the investigations, complaints about real estate agents and brokers were received and handled in accordance with the relevant laws. During the year, a total of 61 cases resulted in penalties for breaching 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, 20 land grant contracts were completed and 21 lease and grant contracts were annulled in 2016. These contracts were of the following three types:

1. Leases and grants: A total of 11 newly granted contracts involving a total area of 4,288 square metres of land; and a return of land of 290 square metres, involving a total floor area of 6,860 square metres;
2. Long-term leases: There were nine contracts in total, no new land was granted, and 30 square metres of land was returned, involving a total floor area of 1,854 square metres; and
3. Annulments of leases and grants: 21 contracts in total, involving a resumption of land with a total area of 330,411 square metres.

Most of the land areas granted during the year were for residential, commercial, industrial and hotel development uses, with land premiums totalling 437,828,929 patacas. Income from land premiums in 2016 totalled 1,099,725,013 patacas, including 915,216 patacas from overdue payments.

## 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 bachelor's, master's and doctoral degrees in the areas of 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 the DSSOPT's statistics, by the end of 2016 – since the new law came into force, over 2,000 professionals have been accredited and registered in 13 professions. The details are as follows:

Professions	Numbers of registered professionals
Civil Engineering	869
Architecture	366
Electrical and Mechanical Engineering	259

(Cont.)

Professions	Numbers of registered professionals
Electrical Engineering	208
Mechanical Engineering	194
Environmental Engineering	47
Urban Planning	43
Landscape architecture	14
Fire Engineering	14
Traffic Engineering	13
Chemical Engineering	11
Industrial Engineering	3
Fuel Engineering	1
<b>Total</b>	<b>2,042</b>

### 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.

### 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.

## 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 2016										
Area	Type	Public sewer system (metres)				Rainwater drains (units)	Public sewage inspection pit (manhole) system (units)	Public rainwater pipe outlets (units)	Outlets valves (units)	Pumping stations (units)
	Sewage piping	Rainwater piping	Combined piping	Flow interceptors (rainwater and sewage)						
Macao		94,057.00	104,191.69	62,431.03	17,473.25	16,215	11,634	178	24	22
Taipa		26,894.34	56,178.40	376.42	24,553.55	4,670	3,477	78	1	21
Coloane		10,965.80	28,179.61	--	15,023.67	624	1,407	63	--	7
<b>Total</b>		<b>131,917.14</b>	<b>188,549.70</b>	<b>62,807.45</b>	<b>57,050.47</b>	<b>21,509</b>	<b>16,518</b>	<b>319</b>	<b>25</b>	<b>50</b>

The Drainage Division of the Civic and 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 2016, the Drainage Division received 20 complaints regarding street flooding caused by rainstorms, along with 207 complaints about silting of main drains. There were 39 prosecutions concerning violation of the General Regulations Governing Public Places, and 56 subpoenas were issued to illegal polluters.

## Slopes

According to the Lands, Public Works and Transport Bureau, as of the end of 2016, Macao had 214 dangerous slopes.

Number of slopes / risk	High	Medium	Low	Total
<b>Macao peninsula</b>	1	19	65	<b>85</b>
<b>Taipa island</b>	1	18	43	<b>62</b>
<b>Coloane island</b>	0	15	52	<b>67</b>
<b>Total</b>	<b>2</b>	<b>52</b>	<b>160</b>	<b>214</b>

The Lands, Public Works and Transport Bureau and the Civic and Municipal Affairs Bureau are responsible for maintaining roadside slopes and slopes in public parks, respectively. In 2016, the Lands, Public Works and Transport Bureau awarded a contract for a high-risk slope upgrading project and continued working on more than five slope maintenance projects that had commenced at the end of 2015.

## 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.

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 ([www.dscc.gov.mo/mosref](http://www.dscc.gov.mo/mosref)) 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 ([adastr.gis.gov.mo](http://adastr.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, street alignment, maximum altitude for buildings in the neighbouring area of the Guia Lighthouse, lists of historic urban areas and heritage under conservation, and other relevant regulations. In addition, the website contains statistical data, executive procedures and laws related to land. By the end of 2016, the website had received over 700,000 visitors since its launch in 2008.

The Macao Online Map ([webmap.gis.gov.mo](http://webmap.gis.gov.mo)) provides geographical information to meet citizens' everyday needs in traditional Chinese, simplified Chinese, Portuguese and English. Users can search for all buildings, streets, government departments, tourist spots and banks in Macao. Since its launch in 2001, it has received more than one million visitors.

Apart from viewing a map and searching for locations, users of the Macao Map – Personal Computer Version can also search for the shortest routes with the electronic road maps. The geographical information in the Macao Map is updated every half-year, and is free for citizens and tourists to download.

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) and a mobile version of the Macao Online Map ([webmap.gis.gov.mo](http://webmap.gis.gov.mo)), which is designed for common mobile phone web browsers and has relatively simple functions. In 2014, information about public

bus routes and stations was added to the original apps, for the convenience of users who travel by public transport.

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

The Traffic and Geographic Information Web ([traffic.gis.gov.mo](http://traffic.gis.gov.mo)) is a cooperative project between the Cartography and Cadastre Bureau and the Transport Bureau, providing locations of roadworks and related traffic diversions in Macao.

The Environmental Geographic Information System ([gis.dspsa.gov.mo](http://gis.dspsa.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 G2G 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 provides Government departments with information such as forms of land use, aerial 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 2016, Macao continued to strengthen regional cooperation in the electric power industry, and took the initiative to foster development of power supplies. The review of the construction plan of the third circuit of the 220kV Macao-Zhuhai electric power transmission channel was completed, finalising the electricity network plan and its schedule. It is expected that after the power transmission channel becomes operational in 2019, the electricity transmission capacity will meet needs until 2025.

To perfect the local power grids, work began on constructing a 110kV substation for Conde S. Januario Hospital, to meet the needs of the hospital's expansion. Preliminary work for constructing a 110kV substation in the islands Health Care Complex has begun. To support the power demand of residents in old districts, five outdoor transmission facilities were installed in appropriate locations in all old districts in Macao.

To develop and progressively promote smart electrical grids, the CEM cooperated with the University of Macau to launch a pilot scheme, by setting up a smart meter system at the university campus in 2016.

In 2016, the first five-year interim review of the implementation of the public services tender contracts of electricity supplies was completed.

In 2016, to ease inflationary pressure and lower burdens on residents, the Government continued to offer the electricity fee subsidy of 200 patacas per month per household.

## Natural Gas

During 2016, construction of the natural gas pipeline network and services progressed on schedule. By the year-end, 75 percent of pipelines of the major natural gas network had been laid across the urban area of Cotai. At present, natural gas is available in Seac Pai Van Public Housing Estate and Hengqin campus of the University of Macau, and for use by buses. Following the establishment of the natural gas pipeline network in the future, more people can choose to use natural gas, which is a cleaner and safer fuel.

To support the application and development of natural gas in Macao, the revised Technical Regulations on Pressure Reduction Stations to be Installed in Fuel Gas Pipelines and Distribution Networks came into effect in September 2016, further improving and complementing the existing gas network technical regulations and hence maintaining consistency.

## Energy Efficiency and Conservation

Followed by the launch of Electric Vehicle Charging Facilities Safety Guidelines at the end of December 2015, the Government installed 60 light-vehicle charging spaces in different districts in Macao in 2016, to facilitate electric-vehicle charging.

To promote the use of energy efficient and durable LED lights, the Government plans to change all streetlights to LED lights, to save energy, improve appearance and safety. In 2016, the Government completed the installation of LED streetlights in Outer Harbour Reclamation Area, then in Seac Pai Van. The work will be expanded to other areas in Macao, including Taipa.

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

## Drinking Water

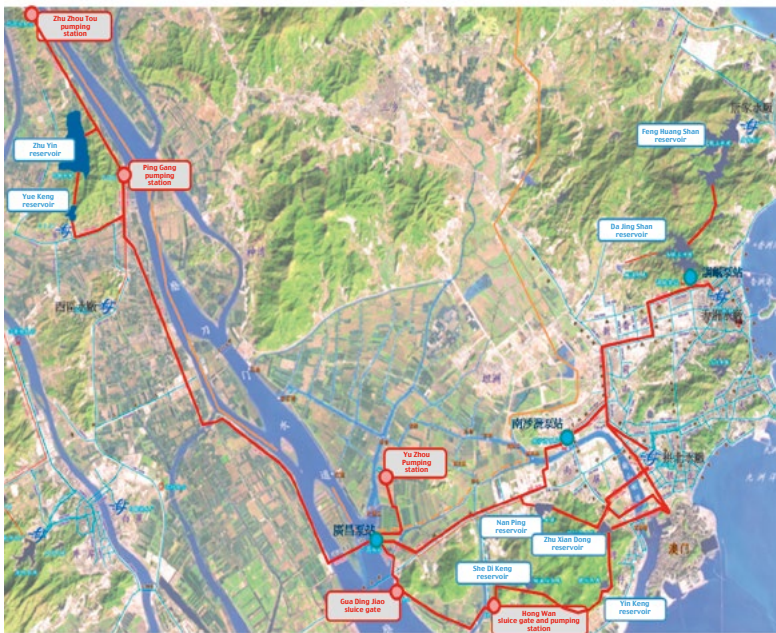
### Macao Water Supply Company (Macao Water)

The Macao Water Supply Company (Macao Water) was established in 1932, and is privately owned. Sino-French Holdings (Hong Kong) 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. Today, Sino-French Holdings (Hong Kong) is a joint

venture between the French-based Suez Lyonnaise des Eaux Group (a new company formed after the merger of the French Lyonnaise des Eaux Group and Suez Group in 1997) and NWS Holdings (a subsidiary of New World Development).

## 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 of Macao's raw water comes from the Modaomen estuary of the Xijiang (West River) in adjacent Zhuhai. In recent decades, to mitigate salinity effects, the raw water intakes for Zhuhai and Macao have been moved upstream.

The blue labels identify reservoirs. Recently, to mitigate salinity effects, the Zhuyin Reservoir was built in Pinggang and trial operation began in autumn 2011.

Zhuhai currently supplies about 265,000 cubic metres of water to Macao each day. In 2016, it supplied a total of 97.02 million cubic metres of raw water. 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.

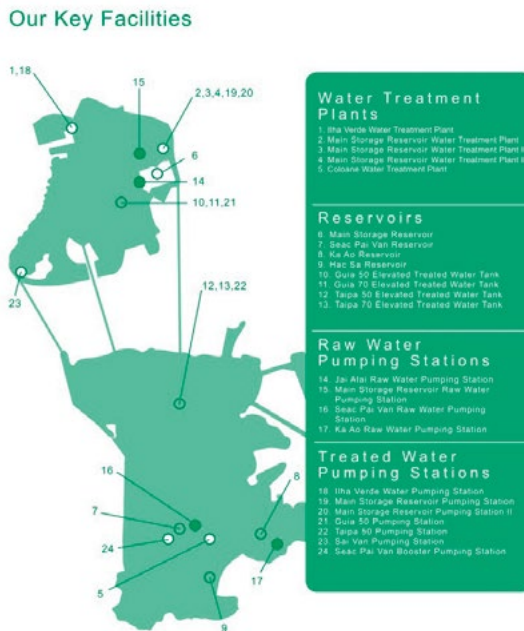
## Water Treatment, Storage and Transportation

Macao’s water treatment capacity is currently 330,000 cubic metres. The combined storage capacity of Macao’s reservoirs (including the clean water pond and high pool in the water treatment works) is 69,300 cubic metres. (The modification of Guia Hill 70-metre pool was completed and commenced operation in 2017. About 3,300 cubic metres of processing capacity for Macao’s reservoirs were unavailable before operations resumed). In 2016, the total length of pipelines was 572 kilometres.

At the end of 2016, the total volume of raw water stored in Macao’s reservoirs (including the Main Storage Reservoir - the Outer Harbour Reservoir, the Seac Pai Van Reservoir, the Ka-Ho Reservoir and the Hac Sa Reservoir) was 2.98 million cubic metres, including 1.9 million cubic metres in the reservoir near the Outer Harbour.

A total of 97.02 million cubic metres of water were supplied in 2016, 2.33 percent more than in 2015. The daily average volume supplied in 2016 was around 265,000 cubic metres, with a maximum of 298,000 cubic metres recorded on 5 October. The increase was primarily due to the openings of the Parisian and the Wynn Palace, as well as mainland China’s National Day “Golden Week” Holidays. In 2016, the total capacity of water sales was 86.7 million cubic metres, with a daily average of 237,000 cubic metres.

## Macao’s Major Water Supply Facilities



## Testing Water Potability

The Laboratory and Research Centre of Macao Water is responsible for water quality testing and analysis, and ensuring the quality of water supplies. The Macao Water Laboratory and the Civic and Municipal Affairs Bureau Laboratory jointly analyse random water samples taken from water processing plants and 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 2000, the Laboratory and Research Centre was issued a Laboratory Accreditation Certificate of ISO/IEC 17025 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 Lyonnaise des Eaux Group, and has been repeatedly regarded as a reference laboratory.

## Customer Services

Macao Water established a consolidated customer information system in 1999, to promptly and properly handle customer enquiries and support customer services.

In recent years, 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 a mobile site in 2014, QR code in water bill, electronic billing, safe email box co-established with Macao Post, and mobile app “Little Water Steward” in 2015, which allows residents to easily handle 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 and individuals who receive the Social Welfare Bureau’s single-parent or medical subsidies or subsidies for the disabled.

As at the end of 2016, Macao Water had 246,378 customer accounts, including 216,525 households, 27,703 companies and 2,150 Government institutions. According to a survey of customer support in 2016, more than 80 percent of customers felt satisfied with the performance of Macao Water, representing a 1.8 percent increase compared with 2014.

## 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 2014 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.

Macao Water was awarded accreditation in quality, occupational health and safety and environmental management – including ISO 9001 Quality Management System Accreditation, an OHSAS 18001 Occupational Health and Safety Management System certificate, an ISO 14000 Environmental Management certificate, and an ISO 22000 Food Safety Management System Certificate received in 2012. This shows that the Macao Water meets global standards in terms of customer services, occupational health and safety, environmental management and water quality.

## 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 472 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 added and upgraded multiple times in 2006, 2007, 2008 and 2015. As a result, there were 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: the Sino-French Group which holds 42 percent, followed by 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 local shareholders 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.

In 2016, CEM's capacity peaked at 932 MW on 9 August, 5.6 percent higher than the peak capacity in 2015.

The Macao electricity transmission network comprises 22 primary substations, six high-voltage substations and 293 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 two 110 kV cables were connected to Gongbei Substation and Nanping Substation, while the two 220 kV cables were connected to Gongbei and Zhuhai Substations, and to Qinyun Substation.

The 11 kV medium-voltage electricity transmission network comprises 41 user substations and 1,410 user transformer rooms (11 kV/400 V) connected by cables with a total length of 706 kilometres. The low-voltage transmission network comprises 842 kilometres of cable, while the street lighting network comprises 527 kilometres of cable and 14,789 streetlights. CEM's power

network is almost entirely comprised of underground cables.

## **Electricity Output and Consumption**

CEM generated 787 GWh of electricity during 2016, an increase of 4.5 percent over 2015. The amount of electricity imported from mainland China was 4,306 GWh, an increase of 6.2 percent over 2015, accounting for 81.9 percent of total electricity consumption; and electricity purchased from the Macao Central Incineration Centre totalled 161 GWh. CEM's sales for 2016 totalled 5,037 GWh.

## **Customer Services**

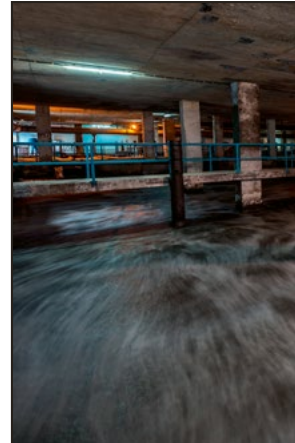
CEM established the CEM Customer Liaison Committee in 2000. With its 27 members coming from 25 different community organisations, the committee serves to reflect public views of CEM's services, and to receive and make suggestions for improvement. At the end of 2016, CEM was providing services to 253,283 households. The Macao peninsula accounted for 81.2 percent of the total customer base; Taipa, 13.72 percent; Coloane, 5.03 percent; Cotai, 0.01 percent; and Hengqin, 0.05 percent.



**Power Supply**



**Wastewater Management**





The five sewage treatment facilities in Macao – the Macao Peninsula Sewage Treatment Plant, Crossborder Industrial Zone Sewage Treatment Plant, Taipa Sewage Treatment Plant, Macau International Airport Sewage Treatment Plant and Coloane Sewage Treatment Plant – can handle 356,000 cubic metres of sewage per day.

Reflecting its commitment to the policy of environmental protection, the Environmental Protection Bureau continues to improve its equipment for handling and treating sewage, upgrade equipment in current sewage treatment plants, gradually increase the capability to treat domestic sewage in Macao, and enhance the quality of treated effluent.

