



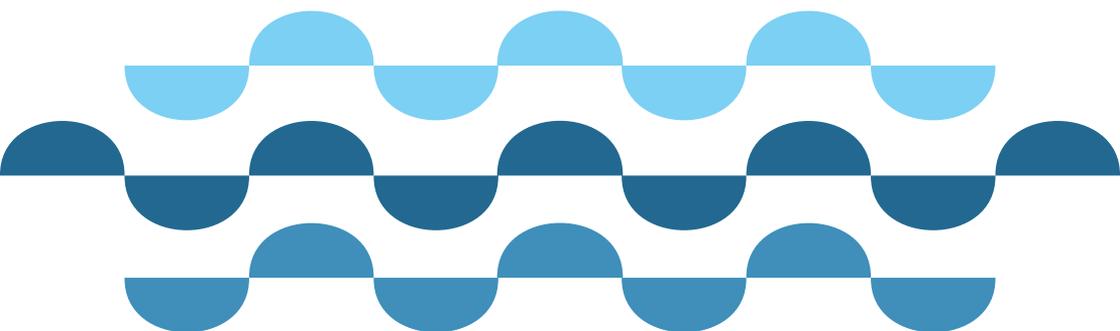
LISBOA
CÂMARA MUNICIPAL



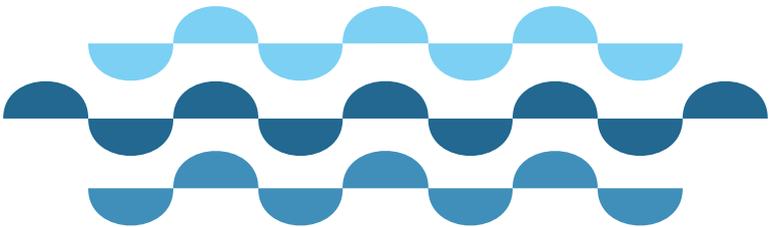
PGDL
PLANO GERAL
DE DRENAGEM
LISBOA

LISBON DRAINAGE MASTER PLAN

2016 - 2030



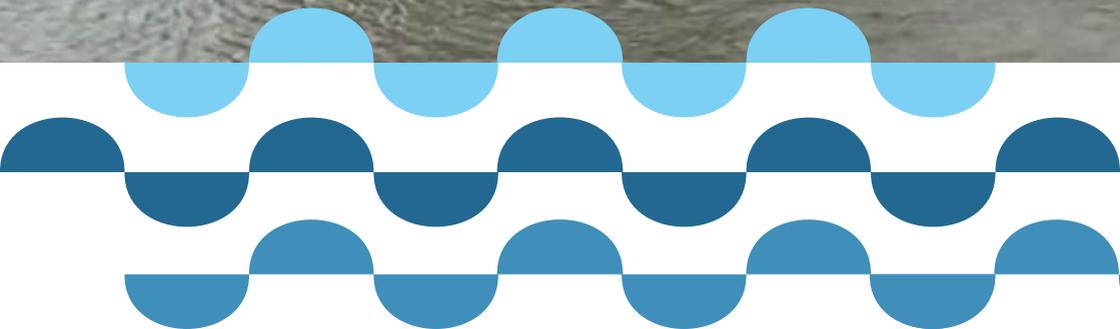
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1. LISBON DRAINAGE MASTER PLAN

1.1. What it is and what it is for?

The Lisbon Drainage Master Plan (LDMP, or PGDL in Portuguese) is reflected in a series of actions aimed to protect Lisbon from floods and inundation, preparing it for future challenges associated with extreme precipitation events.

Situations of inundation are frequent in our city, in particular in critical areas such as the Baixa and Alcântara. These events show a tendency to worsen due to the growing land use and the effects of climate change. In view of this reality, it is extremely important to implement solutions aimed at eliminating or reducing the social, economic, and environmental impacts associated with floods and inundation.



1.2. How is that goal achieved?

The actions of the PGDL, in brief, are embodied in 4 vectors of action:

- ◆ Control at the point of origin - construction of retention/infiltration basins and trench drains;
- ◆ Basin transfers - construction of 2 tunnels with an internal diameter of 5.5 m and total length of approximately 6 Km;
- ◆ Reinforcement/renovation of the sanitation network (domestic and rainwater sewers);
- ◆ Improved knowledge of Lisbon's sanitation system and its operation/monitoring.

1.3. What is the total cost of the project?

The total value of the investment is approximately M€250 for an implementation period of 15 years. Approximately M€8.4 have already been implemented.

1.4. How much of that value will be funded by loans?

Of the total value of the PGDL (M€250), close to 50% will be funded by a European Investment Bank.





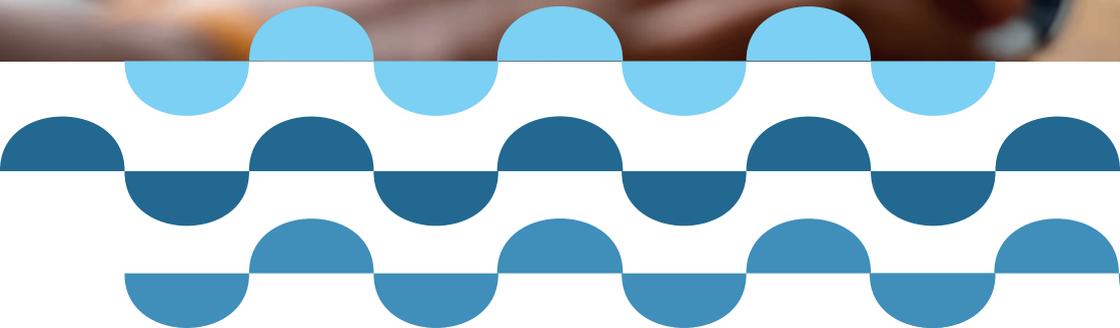
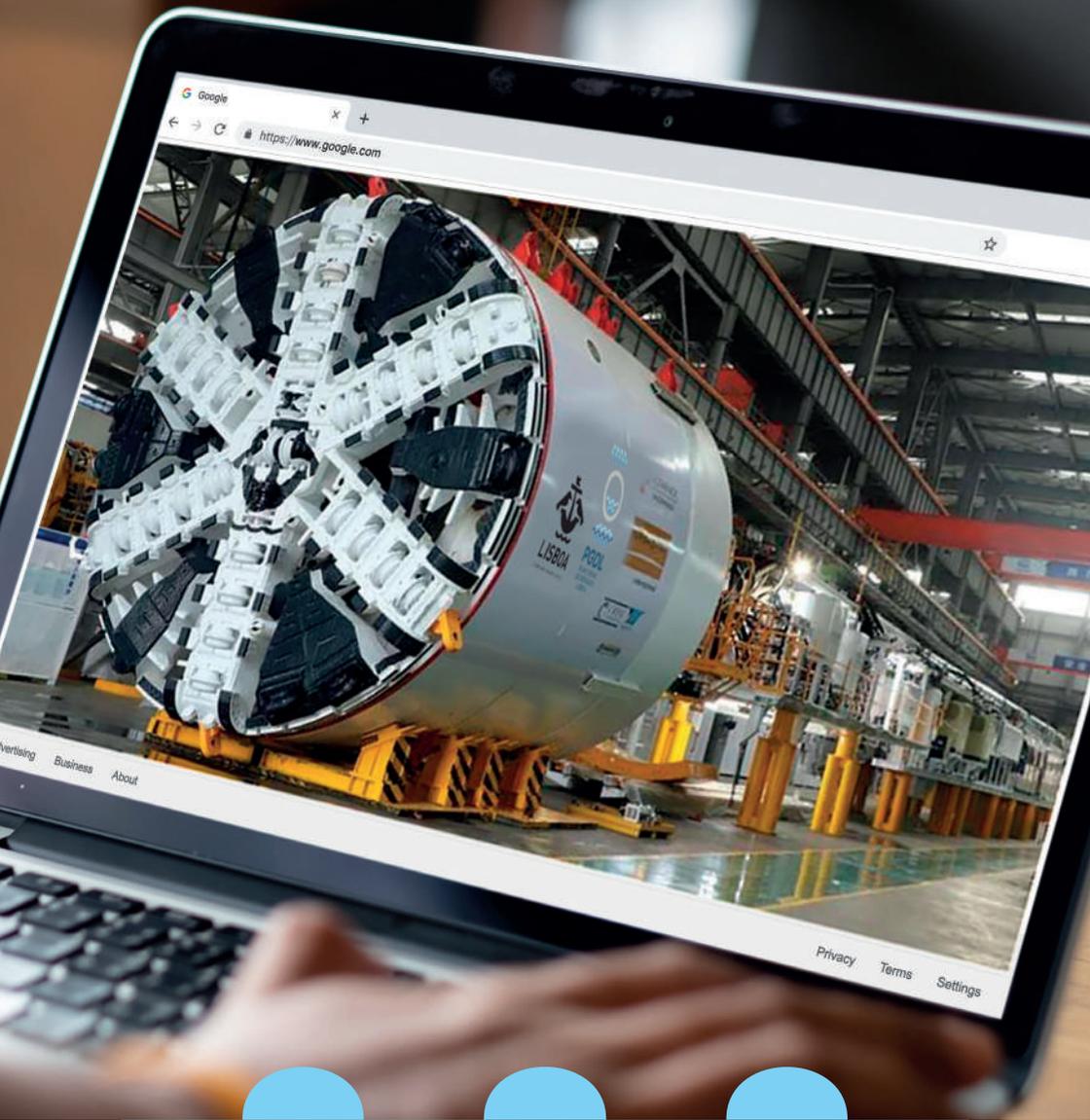
1.5. What has already been done and what still needs to be done?

ACCOMPLISHED

- ◆ Retention basins of Ameixoeira (2018), Alto da Ajuda (2019) and Parque Eduardo VII (2021);
- ◆ Micro-tunnel and 5 dischargers in Parque das Nações and Av. Infante D. Henrique (2020);
- ◆ Survey of the sanitation network register.

STILL NEEDS TO BE DONE

- ◆ Retention/infiltration basins in several parks and gardens of the city (Parque Oeste, Campo Grande, Quinta da Granja, Vale Fundão, Vale de Chelas);
- ◆ Drainage tunnel works (the tunnel boring machine has already arrived @ Lisbon and some segments have already been built). The fieldwork has started in 28th september 2022, and are followed by the excavation of the tunnels, scheduled to start at the end of 2023. The work's completion is scheduled for the first semester of 2025. The value of the investment is approximately M€150 (preparation/works/supervision/technical support); plus, revision of prices;
- ◆ Other works in the sanitation network;
- ◆ Monitoring and notice of the sanitation network's operation.





2. **DRAINAGE TUNNELS**

2.1. What path was taken in order to reach that solution?

2004

Lisbon City Council, on the initiative of the Mayor at the time, António Carmona Rodrigues, and through the Municipal Public Company of Wastewater (EMARLIS), started the process of launching the Lisbon Drainage Master Plan (PGDL), which was awarded to the Chiron/Hidro /Hidra consortium in February 2006.

2008

The first Lisbon Drainage Master Plan was approved. This version, for flood control, considered the construction of reservoirs and a recurrence interval of 10 years (i.e., the highest rainfall which statistically occurs every 10 years). Due to lack of financial capacity, this Plan of 2008 was not implemented.



2014

The creation of a Task Force for the implementation of the Lisbon Drainage Master Plan was approved in a City Council Meeting.

2015

The version of the Lisbon Drainage Master Plan of 2008 was updated, evolving to a solution which envisaged the construction of two major collectors (tunnels), retention/anti-pollution basin and a recurrence interval of 100 years. This version was unanimously approved at a City Council Meeting in December 2015.

2021

A contract was concluded with the Mota Engil / SPIE Batignolles Internacional consortium for the design/construction of Lisbon's drainage tunnels. (Value: €132,900,000 + VAT, Period: 1140 days).

2.2. How do these drainage tunnels work?

The tunnels comprise two routes: Monsanto - Santa Apolónia (TMSA) and Chelas - Beato (TCB).

They have an internal diameter of 5.5 m and are implanted at an average depth of 30-40 m (greatly below the city's buildings. That depth is only lesser in three valley-crossing areas of the city and near the river). These tunnels will capture the water collected at 2 high points





(Monsanto and Chelas), and at additional capture points, along their routes, namely Av. da Liberdade, Santa Marta, and Av. Almirante Reis, conducting all that volume of water into the river (Santa Apolónia and Beato). This mechanism deviates the water that would cause floods and inundation at critical places of Lisbon, during peak rainfall. The **Monsanto - Santa Apolónia Tunnel** is approximately 5 km long. The **Chelas - Beato Tunnel** is approximately 1 km.

2.3. What are the extra benefits associated with the construction of tunnels?

In addition to mitigating the social, economic, and environmental impacts of floods and inundation, the construction of tunnels and basin transfers, associated with anti-pollution basins, will bring in other benefits.

These anti-pollution basins will capture and store the first rainwater (the most polluted due to carrying the waste deposited on pavement surfaces), subsequently conducting them to the wastewater plants (ETARs), already with prior decantation treatment. This enables significantly increasing the volumes of pre-treated water conducted into the River Tejo, mitigating its pollution levels.

Another benefit of the construction of these structures will be possibility of using recycled water for washing pavements, in irrigation and fire-fighting. This will be possible because pipes will be constructed inside the tunnels to conduct the recycled water (from the wastewater plants to the anti-pollution basins in the opposite direction to that of the drainage). This recycled water will be stored in independent tanks, inside the anti-pollution basins, which in turn feed the recycled water hydrants to be installed in the city (purple structures, distinct from the current red fire hydrants, supplied with drinking water).



2.4. Who has designed the project?

The Preliminary Programme was drawn up by the Hidra/Engidro design consortium.

The Implementation Project was designed by Mota Engil/SPIE Batignolles Internacional.

2.5. Who will supervise the work?

The TPF Consortium (TPF - Consultores de Engenharia e Arquitectura S.A. and TPF Getinsa Euroestudios, S.L.).

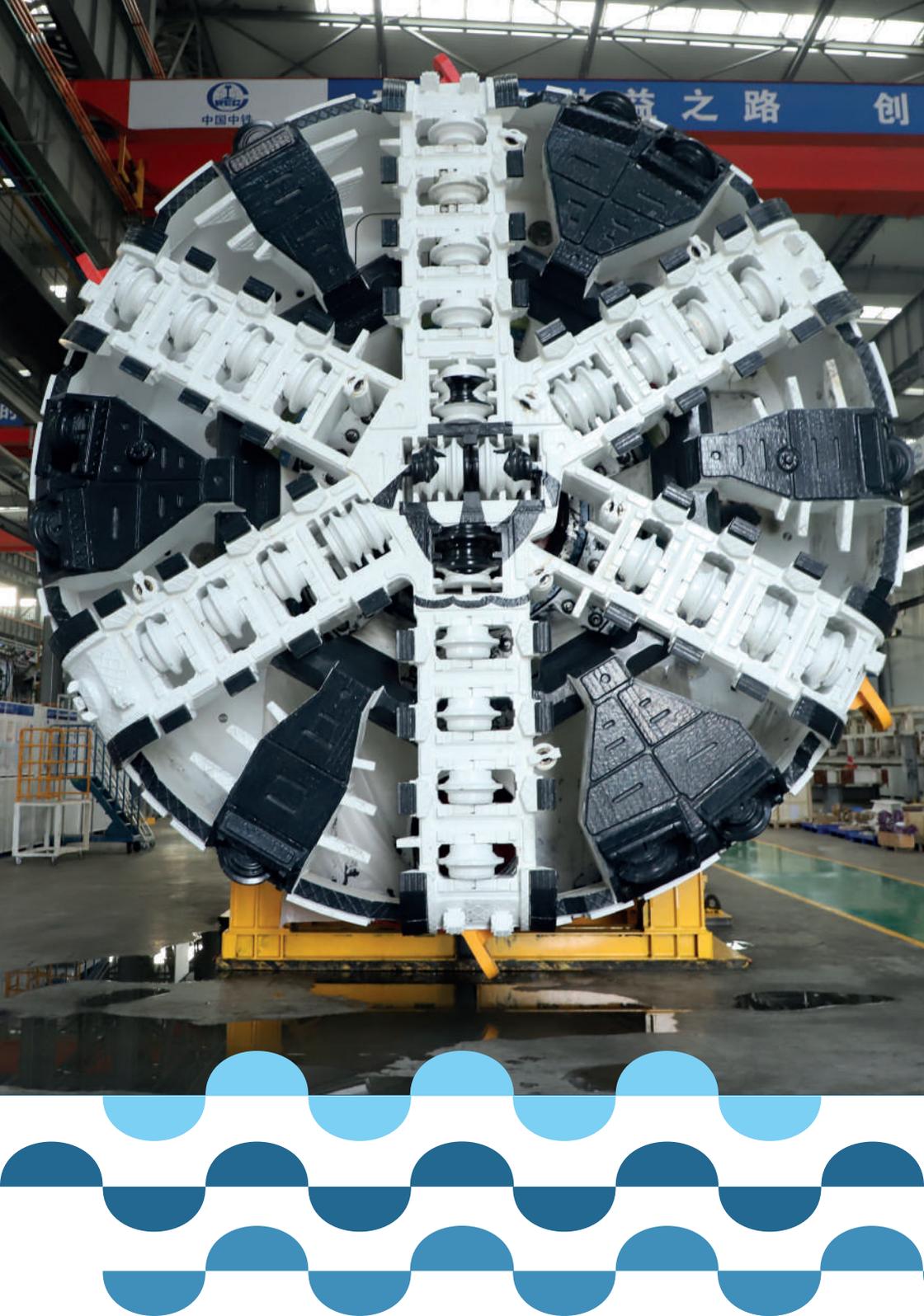
2.6. Who are the main partners in this work (technical security)?

Legal

- Miranda & Associados.

Technical

- LNEC (geotechnics, hydrogeology, hydraulics);
- ISCTE (BIM methodology);
- Hidra/Engidro Consortium (hydraulics)
- IC-FEUP (revisão de projeto);
- 4 Rs (environmental support).





3. THE DRAINAGE TUNNEL WORK

3.1. How many work fronts will there be and with what impacts on the city?

There will be **7 work fronts** that will inevitably have some negative impact on the city, due to the ensuing movement/traffic constraints. The locations are listed below:

1. **Campolide** (September 2022 - November 2027)
2. **Avenida da Liberdade** (February 2023 - August 2026)
3. **Rua de Santa Marta / Rua Barata Salgueiro**
(February 2023 - August 2026)
4. **Avenida Almirante Reis / Rua Antero de Quental**
(November 2022 - October 2026)
5. **Santa Apolónia** (October 2022 - November 2027)
6. **Chelas** (November 2022 - August 2029)
7. **Beato**
TUNNEL (October 2022 - June 2027)
ANTI-POLLUTION BASINS (August 2029)





RUA DE CAMPOLIDE
(September 2022 - November 2027)



AV. DA LIBERDADE
(February 2023 - August 2026)



**RUA DE STA. MARTA/
RUA BARATA SALGUEIRO**
(February 2023 - August 2026)



**AV. ALMIRANTE REIS/
RUA ANTERO DE QUENTAL**
(November 2022 - October 2026)





1ST PHASE

(October 2022 - January 2024)

SANTA APOLÓNIA

(October 2022 - November 2027)

2ND PHASE

(February 2024 - December 2026)



3RD PHASE

(January 2027 - May 2027)



4TH PHASE

(June 2027 - November 2027)





1ST PHASE

(October 2022 - November 2023)



BEATO

TUNNEL (October 2022 - June 2027)
ANTI-POLLUTION BASINS (August 2029)

2ND PHASE

(July 2023 - December 2025)



3RD & 4TH PHASE

(January 2026 - August 2029)



CHELAS

(November 2022 - August 2029)





3.2. How many workers will be on-site simultaneously?

At the peak of the work, it is expected that approximately 800 workers will be on-site simultaneously.

3.3. What are the potential unforeseen developments?

It is a complex geotechnical work in an urban environment, so unforeseen developments may occur, in particular related to:

- ◆ Geology/geotechnics/hydrology;
- ◆ Archaeology;
- ◆ Remediation of contaminated soils;
- ◆ National and international circumstances that could interfere in the availability of construction materials and labor.





4. **WHAT IS BEING DONE TO INFORM THE CITY?**

Information campaigns are being prepared, directed to:

-  The public in general;
-  Parish Councils;
-  City stakeholders representing trade, services, transport, educational establishments, hospital services, environmental associations, safety, security and emergency structures, infrastructure concessionaires, etc.;
-  Municipal services and companies.



ANNEX

(City Council Meeting TIMELINE)

- ◆ Proposal submitted at a City Council Meeting, for approval of the development of the Lisbon Drainage Master Plan (PGDL), held on 6 March 2008. Approved by the majority with 15 votes in favour and 2 votes against.
- ◆ Proposal submitted at a City Council Meeting, for approval of a Task Force related to the Implementation of the PGDL (comprising: Eng. Silva Ferreira, Eng. Pedro Botelho, Arq. Maria Teresa Almeida and Arq. Pedro Dinis), on 10 and 11 December 2014. Approved by the majority with 13 votes in favour and 3 abstentions.
- ◆ Proposal submitted at a City Council Meeting, for approval of the transformation of the Task Force into a Project Team (EPPGDL), with duration of 5 years, extendable (Coordinator: Eng. Silva Ferreira, on 15 July 2015) Approved by the majority with 13 votes in favour and 3 abstentions.
- ◆ Proposal submitted at a City Council Meeting, for approval of the PGDL 2016-2030, on 16 December 2015. Unanimously approved.
- ◆ Proposal submitted at a City Council Meeting, for approval of the decision to award a Tunnel Construction Contract, through an International Open Tender, of the design/construction type, on 22 June 2017. Unanimously approved. The tender procedure received no response - revocation of contracting at the City Council Meeting on 21 December 2018.



- ◆ Proposal submitted at a City Council Meeting, for approval of the extension of the duration of the EPPGDL on 17 September 2020. Approved by the majority with 9 votes in favour and 8 abstentions.
- ◆ Proposal submitted in a City Council Meeting, for approval of the decision to award a Tunnel Construction Contract, through the 2nd International Open Tender, of the design/construction type, on 25 July 2019. Approved by the majority with 13 votes in favour and 4 abstentions. Approved by the majority at the Municipal Assembly of 10 September 2019.
- ◆ Proposal submitted at a City Council Meeting, for approval of the Tunnel Construction Contract's award on 21 December 2020. Approved by the majority with 12 votes in favour and 4 abstentions.
- ◆ Contract concluded between Lisbon City Council and the Mota Engil / SPIE Batignolles Internacional consortium on 28 April 2021, with the implementation period commencing on 29 July 2021 (1 day after the disclosure of the Court of Auditors Prior Approval). Value: €132,900,000 + VAT; Period: 1140 days (approximately 3 and a half years).



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