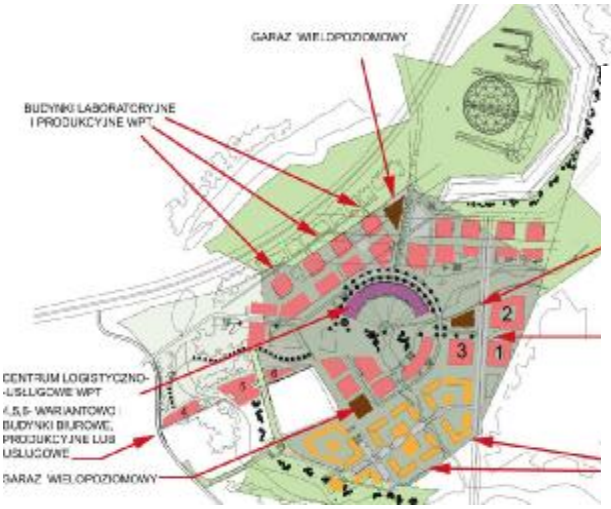
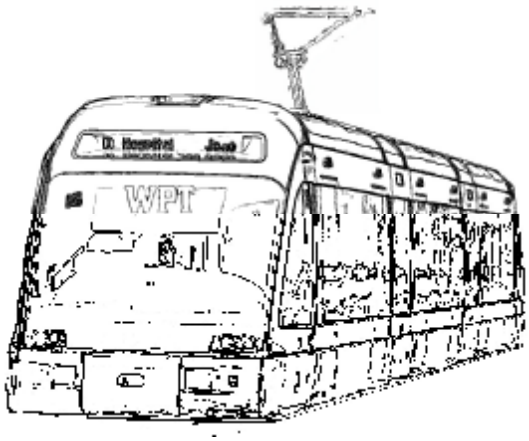
TRAMWAJE WARSZAWSKIE Sp. z o.o.

20 Siedmiogrodzka Street, 01-232 Warsaw

FEASIBILITY STUDY FOR A PROJECT:
Construction of the tram link to Warsaw Technology Park

SYNTHESIS





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TransEko

Warsaw, January 2007

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The synthesis presents results of the Feasibility Study for a project entitled **"Construction of the tram link to WPT"** (*"Budowa trasy tramwajowej do WPT"*), executed by consortium FaberMaunsell Sp. z o.o. and FaberMaunsell Ltd for Warsaw Tramways Ltd., 20 Siedmiogrodzka St, 00-099 Warsaw.

Tramway route analysed in this Study is a task of high priority for the local government of Warsaw and was put on a list of urgent tasks within Warsaw's "Strategy of Sustainable Development of the Transport System of Warsaw for years 2007 – 2013 and beyond"(*Strategia Zrównoważonego Rozwoju Systemu Transportowego Warszawy na lata 2007-2013 i dalsze*).

Feasibility Study was prepared in order to apply for EU financial support for tram link construction.

A SUMMARY OF THE RESULTS

In the study 3 construction variants of the WPT tram link were analysed. The results confirmed that the construction would increase the reliability of Warsaw urban transport system, by reducing travel times and by improving the quality of passenger changes on stops. In addition, due to the location of the tram link and its final stop at WPT the new tram will also play an important role in improving the quality of public transport travels from the Siekierki area as well WPT (Warsaw Park of Technology).

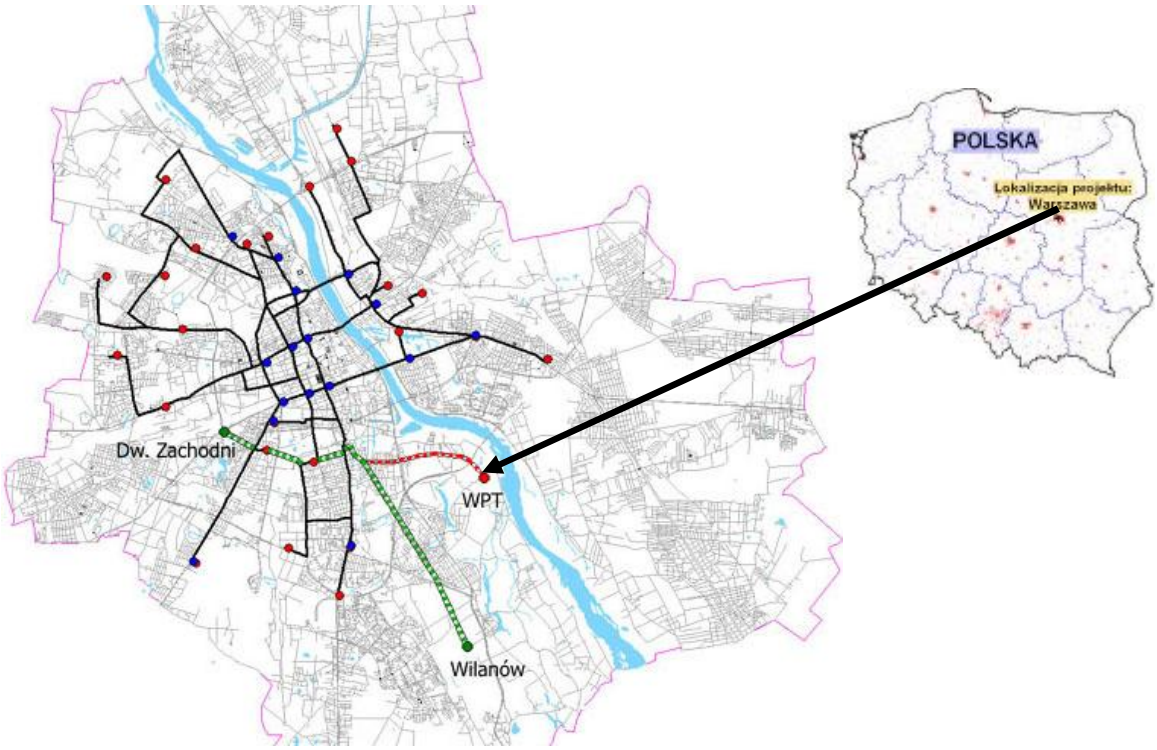
Thus the project foresee possible new passengers for public transport, travelling within the city of Warsaw to work as well as passengers travelling to WPT. The project will generate a great alternative for travels by car for all these groups of transport system users.

Proposed construction variant of a new tram

Considering passenger traffic forecasts, investment costs, possible collisions with the road network, pedestrian traffic and the underground city infrastructure, social cost-benefit analysis and the possibilities of creating construction stages, **the following variant of a two-track tramway route was deemed to be the most beneficial** (picture 1):

- Goworka St (from Belwederska crosiing) – track-way for trams and buses situated within a widened central reservation,
- Czerniakowska – bis - track-way situated within central reservation,
- Nowoprojektowana Wschodnia - track-way situated within central reservation.
- Bartycka – track-way situated on the south side of the street,
- Nowo Batycka - track-way situated within central reservation
- Augustówka - - track-way situated within central reservation
- Sieierki Terminus (close to power station EC Siekierki).

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Picture 1. Location of the "WPT" tram link

Passenger traffic forecasts

Forecasts of the expected passenger traffic indicated the following points:

- In 2016 the number of passengers per cross-section (i.e. a total in both directions per hour) in the morning peak will vary from 250 At WPT. to 3050 on Gagarina St.
- The number of passengers served by the new link will be at the level of 3500 passengers during morning peek hour.
- Tramway pass-km and pass-h will be increased (by ca. 17 thousand passenger-kilometres in the peak hour and ca. 700 passenger-hours in the morning peak hour) what will improve the effectiveness of the public transport system as a whole.

Track infrastructure

It was assumed that the WPT tram link will use two types of track structure:

- Ballast & sleeper structure – used along Czerniakowska Bis st and Nowoprojektowana Wschodnia st, bus&tram stops at Gagarina St and Siekierki Terminus
- Ballast-less structure – with concrete substructure and varied track-way fill depending on track-way location (separated, in the carriageway, bus and tram track-way) – used along newly build track stretches at:
  - switch nodes,
  - track-ways built into carriageway and track-ways adapted to used by both trams and buses (Gagarina St),
  - separated track with grass track-way fill.

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Power supply

Traction energetic system will ensure reliability of power supply and full use of modern trams with onboard high-end propulsion systems. The new investment will require:

- construction of 3 new substations,
- overhead wire network construction of a total length of ca.6,5 km.

Bus and tramway traffic setup

The new tram link will be served by:

- new tram line: Dw Zachodni – Banacha– Puławska – Goworka – Gagarina – Bartycka – WPT – EC Siekierki, whith the frequency of 5 minutes;
- A common use of track-way by trams and buses on the stretch from Spacerowa/Belwederska/Gagarina node to Czerniakowska St (1170m) and the construction of three common bus&tram stops: Stępińska, Iwicka, Sielece,

Traffic organisation and control

Apart from collision points with road and pedestrian network (intersections, property entrances and pedestrian crossings), the route will be in general located as a separated track-way or a track-way with allowed bus traffic. Good conditions for trams movement from Dw. Zachodni to WPT will be possible thanks to modern traffic control. The requirements, for the section from Spacerowa/Belwederska/Gagarina to EC Siekierki are as follows:

- an installation of 22 new traffic lights on intersections, pedestrian crossings and car crossings,
- a modernisation of traffic light control systems on the 5 existing intersections and pedestrian crossings in order to apply traffic light priorities for trams.

Stops for passengers

There will be 15 passenger nodes located along the route with a total number of 32 platforms, each 33 meters long, and 3.5 meters wide. At Gagarina street bus&tram stops will be longer 52m

In addition:

- there will be a common standard of materials, colours, passenger equipment set and its placement,
- all the platforms will be tuned to the needs of the handicapped (for example: platform height of 22 cm).

In 6 selected main interchange nodes ticket machines and information panels will be mounted, with an access to the public transport information database. 32 stops will be equipped with CCTV cameras connected to the route's monitoring system.

Passenger information system

Passenger Information System of the WPT tram link will include both traditional means of providing information and a dynamically updated system using electronic displays (in tramways and on platforms). It is planned to install 29 standard platform information displays.

Communication system will meet the needs of the elderly and disabled people by providing vocal information in both automatic and triggered modes.

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Rolling stock

The new tram link will require purchasing of 8 new low floor tram cars, bidirectional and articulated. The purchases were tuned to passenger carriage forecasts (travel time, number of passengers). It was assumed that all the stretches of the route must have a peak hour headway of not more than 5 minutes as a rule.

Other actions

The project assumes that there will be 5 interchange nodes in operation, created by appropriate platform location and by providing passengers with information on possible changes. This information will be provided onboard at trams and on stops.

Additionally, in order to increase the effectiveness of a new tram bike & ride facilities will be located in the vicinity of 6 stops (Gościniec, Sanktuarium Siekierki, WPT 1, WPT 2, Augustówka, Pętla EC Siekierki). It will give an additional improvement of the access to the tram link.

Investment costs

The investment cost of the project will be at the level of 218 **mln zł** (without VAT) including:

- tramway route construction costs –149,5mln zł,
- rolling cost purchases – 68,8 mln zł.

Results of economic and sensitiveness analysis

The economic analysis was included a calculation of economic indicators: NPV (Net Present Value), Benefit-to-Cost ratio (B/C) and an IRR (Internal Rate of Return). These indicators allowed for a comparison of project's benefits with costs in the assumed period of analysis. The discount rate was assumed on a level of 6%. **The resultant economic indicators (IRR = 13,0%; NPV = 196,8 mln zł) are a proof of a high economic value of the project. The sensitiveness analysis of the project** to changes in investement costs and the number of passengers flows **has also confirmed this.** The sensitiveness analysis was calculated for all the combinations of the following parameters:

- investment costs decreased by 20%;
- investment costs increased by 20%,
- passenger carriage forecasts decreased by 20%,
- passenger carriage forecasts increased by 20%.

In case of investment costs increased by 20% and passenger carriage forecast decreased by 20%, the internal rate of return of the project equals 7,1%.

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