



SITE SELECTION AND PLANNING FOR NEW PORTS AND SPECIALIST MARINE TERMINALS ON GREENFIELD SITES - TECHNICAL GUIDELINES

Terms of Reference

1. Historical background - Definition of the problem

PIANC WG 158 considered masterplans for the development of existing ports. It specifically excluded discussion on the site selection and development of new ports and marine terminals on green field sites, but concentrated on the planning requirements for the expansion of existing ports.

While the technical guidelines given in PIANC WG 158 report on port planning are equally relevant to the development of ports and terminals on new greenfield sites, this working group should consider the additional issues involved in the early planning and design stages of such new port and maritime facilities. These issues include:

- identifying and evaluating options and defining the optimum location for new development,
- consideration of geotechnical and environmental parameters of the development site
- considering the operational performance needs of the port or terminal
- considering the economic issues, particularly the relationship of a new site with the existing area and hinterland links
- considering urban and transport networks planning
- considering the impact a new port may have in terms of new logistics chains or a change (a major one in some cases) to existing logistics chains. and
- the integration of these geotechnical and environmental conditions with economic issues and the operational criteria to optimise new greenfield port or terminal development.

2. Objective of the study

This working group follows on naturally from the report of PIANC WG 158 "Port planning for the development of existing ports" and considers the specific issues concerned with the site selection and planning of new ports and marine terminals on green field sites.

The design of the new port or marine terminal facilities on a new site must take into consideration a wide range of environmental parameters including geology, wind and wave climate, water levels, currents, visibility, sediment transport and environmental/ecological sensitivities.

The study should critically review state-of-the-art site selection and evaluation techniques for new sites as well as provide general guidelines on the physical planning of new ports and terminals, with case studies where possible.

3. Earlier reports to be reviewed

There are a number of PIANC publications which are of relevance to this working group:

MarCom WG158	Masterplans for the development of existing ports	2014
MarCom WG160	Overview of Design Codes and guidelines for Harbour Structures	to be published
MarCom WG164	Upgrade of Port Terminals by increasing dredged depth	to be published
MarCom WG167	Design of terminals for RoRo and RoPax vessels	to be published
MarCom WG171	Ship Handling Simulation	to be published
MarCom WG172	Small and medium LNG terminals	to be published
Report n° 121 2014 (MarCom WG 49)	Harbour Approach Channels Design Guidelines	2014
Report n° 135 2014 (MarCom WG 135)	Design Principles for Container Terminals in Small and Medium Ports	2014
Report n° 143 – 2014 (EnviCom WG 143)	Initial Assessment of Environmental Effects of Navigation and Infrastructure Projects	2014
Report n° 150 – 2014 (EnviCom WG 150)	'Sustainable Ports' A guide for Port Authorities	2014
Report n° 134 (RecCom)	Design and Operational Guidelines for Superyacht Facilities	2013
EnviCom WG 136	Sustainable Maritime Navigation	2013
MarCom report 115	Criteria for the (Un)loading of Container Vessels	2012
MarCom report 117	Use of Hydro/Meteo Information for Port Access and Operations	2012
MarCom report 116	Safety Aspects Affecting the Berthing Operations of Tankers to Oil and Gas Terminals	2012
EnviCom TG2	Towards a Sustainable Waterborne Transportation Industry	2011

PIANC Report 112	Mitigation of tsunami disasters in ports	2010
EnviCom TG3	Climate Change and Navigation - Waterborne transport, ports and waterways: A review of climate change drivers, impacts, responses and mitigation	2008
MarCom report of WG 35	Dangerous cargoes in ports	2000
PTC2 report of WG 18	Planning of fishing ports	1998
PTC2 report of WG 11	Port facilities for ferries - practical guide	1995
PTC2 report of WG 24	Criteria for movements of moored vessels in harbours - a practical guide	1995

4. Matters to be investigated

The primary requirements for a new greenfield port or marine terminal are:

- To be accessible or located close to the main centres of cargo supply/delivery
- To have suitable onshore areas for storage and processing (e.g. if it is a specialist marine terminal to handle bulk solids or LNG)
- To be located in a sheltered area for operations and provide a safe marine access to the berth(s)

If these criteria are not available naturally then there will be a need for them to be artificially created by dredging of access channels and manoeuvring areas and creation of protected water areas using artificial breakwaters. The key objectives to be considered at planning stage are to:

- ensure minimal risk to safe marine access
- ensure safe conditions for loading/unloading operations
- minimise the construction and operational costs and implementation schedule and
- mitigate any risks to construction and operations.

The location of a new port should therefore be based on a selection and comparison between alternatives in relation to various criteria:

- Maritime approach
- Port development (water and land development)
- Logistics areas adjoining the port
- Possibility of urban development
- Connections to general networks in terms of:
 - Land transport
 - Power grid
 - Water supply

The working group should therefore review the best methodology and available techniques to ensure a logical and coherent process in the identification and evaluation of new port and terminal sites and the overall strategic port masterplan development of the site, based on the port masterplan guidelines proposed in WG158.

5. Method of approach

The WG should collect and review of all relevant information and documents, define the table of contents and organize the Working Group by assigning specific tasks (and a deadline) to each member. The WG should define the best format and content to produce a comprehensive and easy-to-use document.

In particular, in order to understand the physical constraints of the site on the project, comprehensive data is required on the following items:

- The bathymetry of the site gained from hydrographic surveys and navigation charts.
- Wind climate taken from long term meteorological records if possible
- Wave climate data taken from long term records if possible
- The seismicity of the area gained from historical records and site surveys
- Current movement measured on site if possible
- Topographical data taken from land surveys and satellite imagery
- Environmental constraints
- Geotechnical conditions

The WG will need experts able to identify and address each of these issues. The determination of geological/geotechnical conditions required extensive survey and investigation work, while metocean conditions normally requires both on-site data collection and computational modelling including wave climate models, current models, sediment transport models and shoreline evolution models.

In addition the operational performance needs must be determined in terms of design vessels sizes, marine access, shipping downtime, cargo operations and storage requirements, taking into consideration the metocean conditions affecting the marine terminal operations.

The working group should also address the impact of port development on overall logistics chains, both new and existing. Even in the case of a new port dedicated to a single industry, there could be additional opportunities or benefits to be gained in developing other kinds of traffic.

The Working with Nature concept should be considered.

6. Suggested final product of the Working Group

Technical Report providing guidelines for site selection and evaluation of new sites for the development of ports and specialist marine terminals, underlining main principles and recommendations. The Report should concentrate on the physical and economic considerations for development of ports and terminals on greenfield sites. It should not deal with the general port planning and development issues covered by WG158 (port lay-out; port zoning; general performances to be fulfilled), nor with the detailed planning and design of specific port terminals which are covered by other PIANC WG reports.

The Report should provide special emphasis on:

- Identifying possible methodological approaches to site selection and evaluation of greenfield ports and terminals, pointing out critical aspects and possible solutions (the "process")
- Providing a comprehensive general check-list of the issues to be addressed, such as metocean studies, geotechnical investigations, economic assessments including traffic forecasts and hinterland links, technical studies, model tests and navigation simulation, environmental studies, cost-benefit studies, economical/financial studies;
- Providing a selected list of any relevant technical standards and codes of practice (international and/or national) and of the selected bibliography commonly used for the specific technical aspects of site selection and evaluation for new greenfield ports and terminals
- Including selected case-studies pointing out "lesson learned" from them.

7. Desirable disciplines of the members of the Working Group

Port planners and designers, metocean and geotechnical specialists, environmental experts, economic experts, urban planners. Also sister Associations such as IAPH should be invited to the Working Group.

8. Relevance for countries in transition

The Report should provide valuable guidance for countries in transition, based on the fact that they have a significant requirement for "know-how" in site selection and evaluation for new greenfield ports and terminals, in the light of an environmentally sustainable development of port infrastructure.