TRAINING MANUAL 1
INTEGRATED SOLID WASTE MANAGEMENT PLANNING

Module 1-5: Siting of ISWM Facilities

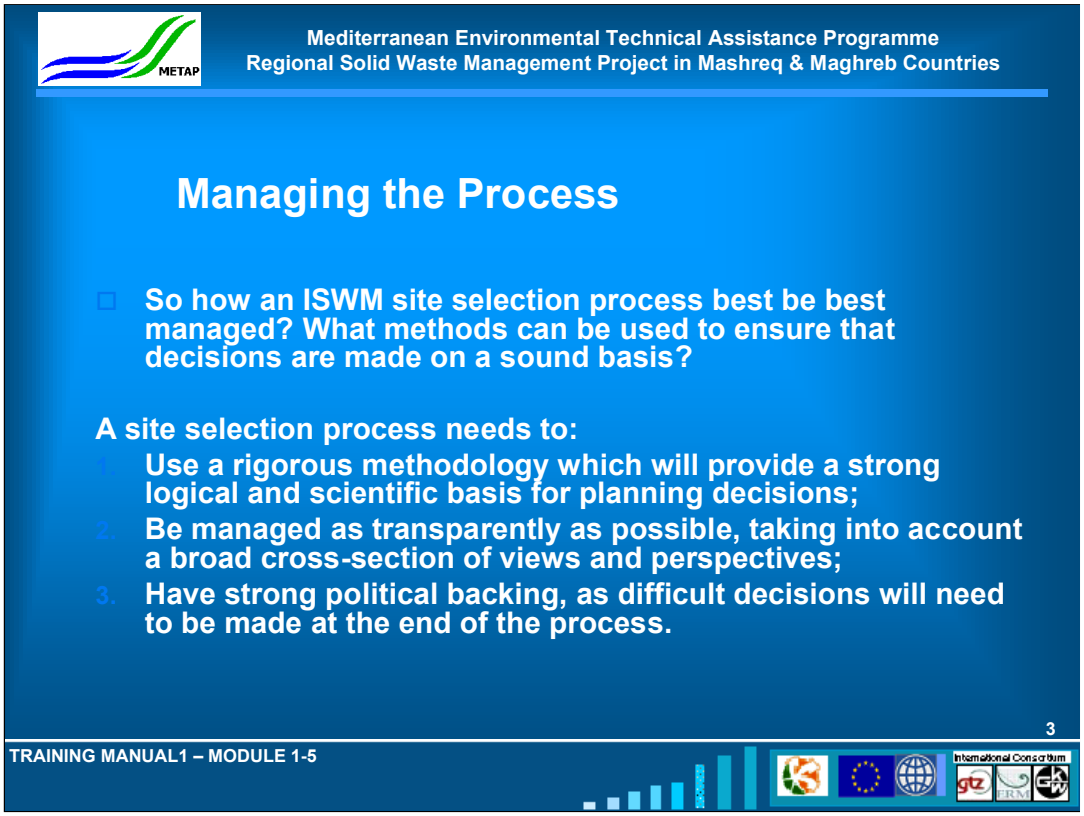
Prepared by the International Consortium
GTZ-ERM-GKW

There is a strong likelihood of receiving some opposition to the proposed site for an ISWM facility.

In some cases this opposition can be extremely well organized and powerful – sometimes generating local level political unrest, and catalyzing the formation of lobby groups mobilized to reverse or overturn decisions.

Opposition is likely to be greatest for landfill and incineration facilities. As these are the mainstream methods for bulk waste/treatment and disposal, well coordinated political/public opposition can paralyse development of the waste management system.

Opposition is also typically very strong where one region/municipality is receiving waste from another region/municipality, or where a City's waste is being transported to a satellite municipality for treatment/disposal. In these cases there must be some way of sharing the benefits of the ISWM facility or compensating the 'host' community where the facility is to be located.



So how can an ISWM site selection process best be best managed? What methods can be used to ensure that decisions made, however difficult politically, are made on a sound basis? These questions form the core of this Module.

A site selection process needs to:

Use a rigorous methodology which will provide a strong logical and scientific basis for planning decisions;

Be managed as transparently as possible, taking into account a broad cross-section of views and perspectives;

Have strong political backing, as hard decisions will need to be made at the end of the process.

Possibly the most important factor influencing the acceptability of a site is its proximity to residential areas. Resettlement and/or community disruption can cause severe social disruption and delays in implementation.

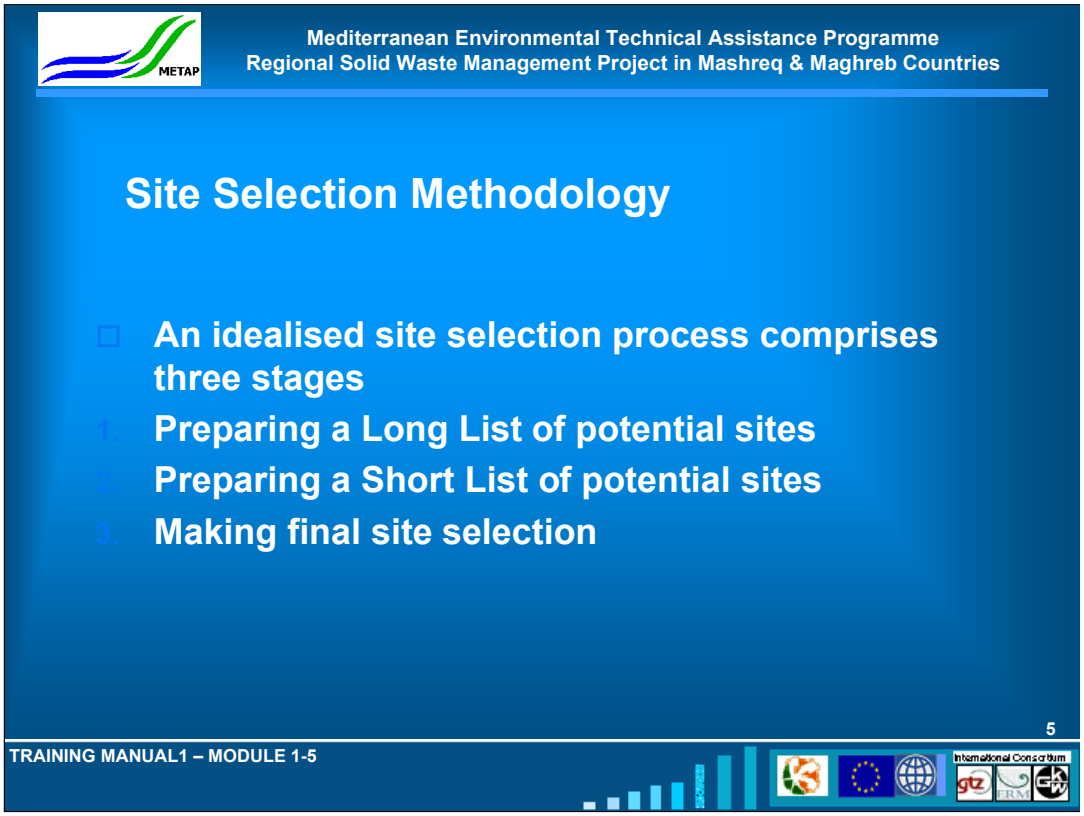
Secondly, the proximity of the site to sensitive water resources is a key concern to communities, planning and drinking water supply authorities, and is a real environmental problem.

A third important factor influencing the acceptability of a site is the size of the site, and the potential economy of scale that can be offered by its development. Larger sites are strategically preferable, and allow the limited resources available for operation and environmental protection to be focused on one site rather than spread out between many. Inter-municipal cooperation often becomes a major consideration when developing these larger, more cost effective, sites.

A further determinant which heavily influences the acceptability of a site is the extent of local community opposition. Such opposition can always be anticipated, in particular in those areas where little effort has been made to upgrade operational and engineering standards of existing dump sites. Selecting sites which are acceptable in environmental terms and ensuring full political commitment to maintaining operational standards will improve the public acceptability of the landfill development. Local communities should be fully consulted about proposed landfill developments.

A working group of experts should lead the process. A wide range of parameters should be evaluated and therefore the working group should include specialists from a broad range of disciplines: planning, engineering, social, environmental etc.

It is essential to inform and consult the public at key stages in the site selection process. Consultation must observe the rights of people to contribute to the site selection process and voice their concerns/objections to a proposed facility.



It is important to ensure that the methodology for selecting the site is transparent and rigorous, otherwise these decisions may be `unraveled' later and cause significant delay in the introduction of improved ISWM practices. There are several methodologies available to assist site selection; all of which slightly differ.

Ideally, the process can be organized into three site selection stages:

identifying a long list of sites

short listing

making a final selection

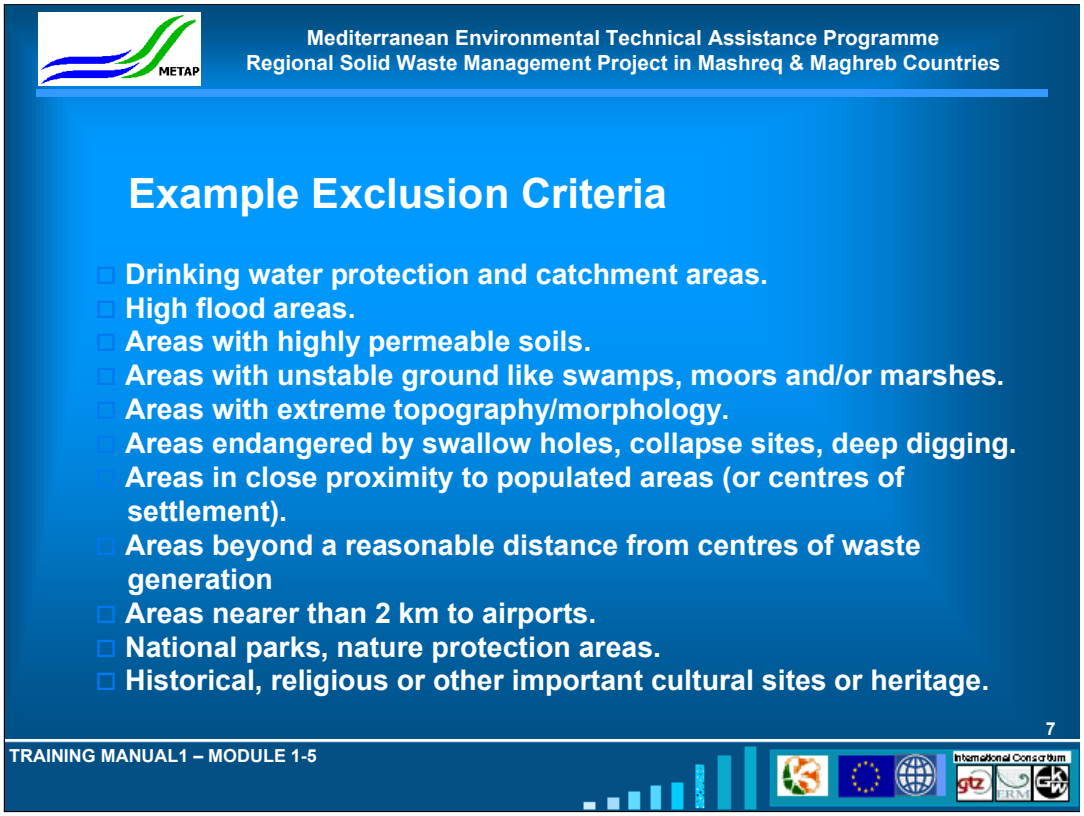
Different analytical approaches should be used at different stages in the process, with more detailed site-specific evaluation being carried out when there are fewer available options for sites – thus focusing time and resources.

The following slides outline the approaches and analytical techniques which may be used for each stage of the process.

A long list of 5-20 potential MSW disposal sites should be drawn up. The long list should mark out areas for potential development of ISWM facilities, which have the possibility of being acceptable in logistical and planning terms. Note that actual site footprints need not be determined at this stage.

Long listing should be carried out as a formal procedure. The technical working group, or consultants, may prepare the long list utilising a range of agreed site exclusion and inclusion criteria. However, this long list must be formally adopted by an inter-departmental steering committee.

The important point is that once the long list is agreed, it should be formally adopted. There should be no possibility of adding further sites at a later planning stage as this will undermine the authority of the process.



Site exclusion criteria may be:

Existing or planned (ie, already officially registered) drinking water protection and catchment areas.

High flood areas.

Areas with soil conditions that allow a fast penetration and permeation of water or possible leachate to aquifers.

Areas with unstable ground like swamps, moors and/or marshes.

Areas with extreme morphology (steep slopes, danger of landslides/avalanches etc.).

Areas endangered by swallow holes, collapse sites, deep digging.

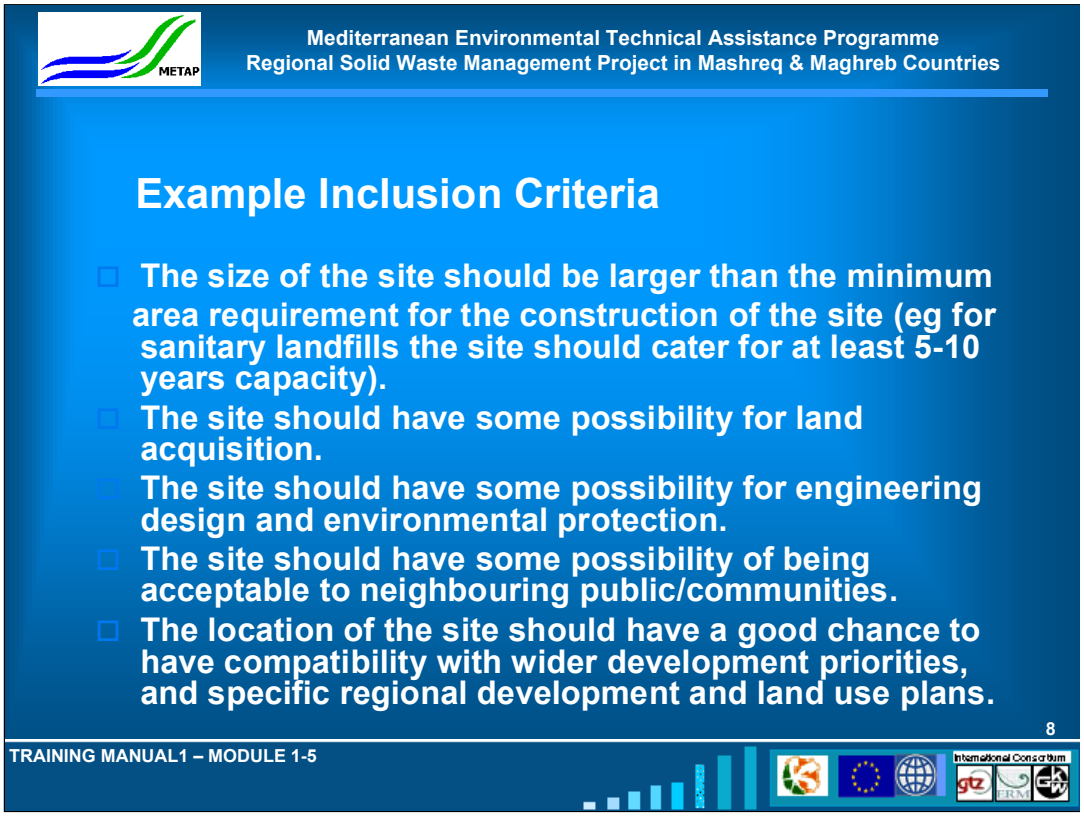
Areas in close proximity to populated areas (or centres of settlement).

Areas beyond a reasonable distance from centres of waste generation (note that transfer stations may be used to extend the economical transport distance)

Areas nearer than 2 km to airports.

National parks, nature protection areas and nature monuments, areas with a large number of precious fauna and flora.

Historical, religious or other important cultural sites or heritage.



Sites should conform to the following inclusion criteria:

The size of the site should be larger than the minimum area requirement for the construction of the site (eg for sanitary landfills the site should cater for at least 5-10 years capacity).

The site should have some possibility for land acquisition.

The site should have some possibility for engineering design and environmental protection.

The site should have some possibility of being acceptable to neighbouring public.

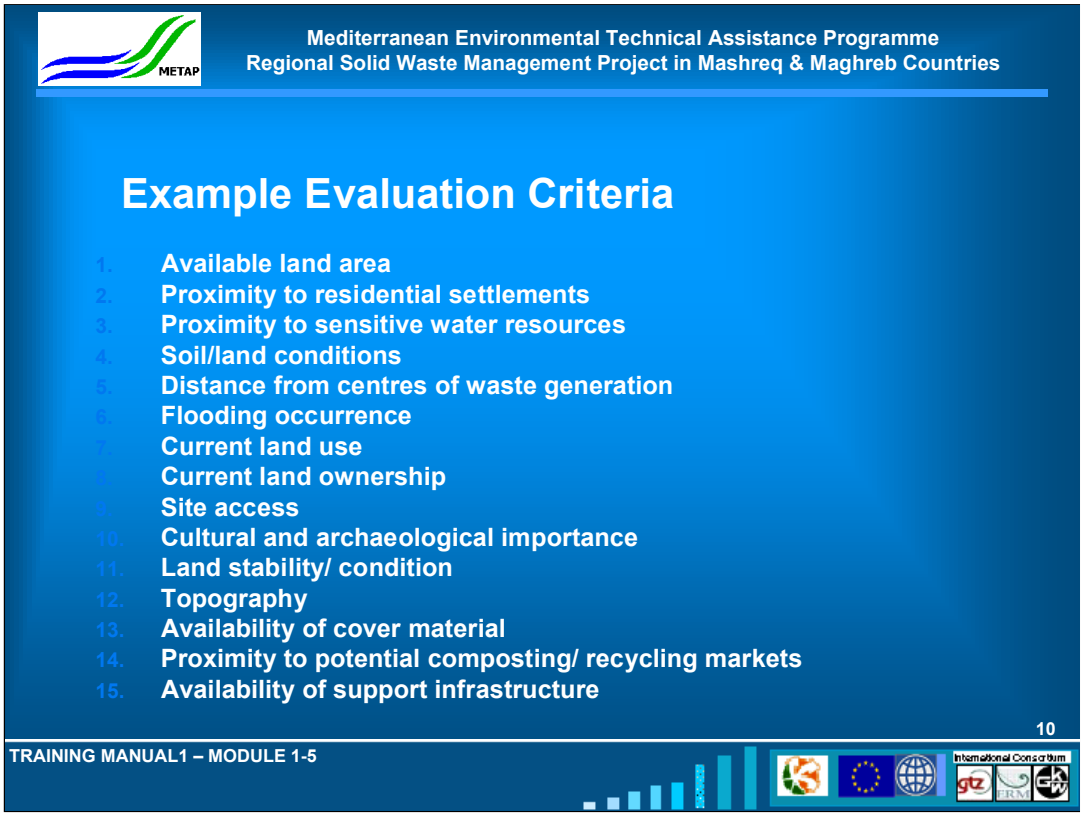
The location of the site should have a good chance to have compatibility with wider development priorities, and specific regional development and land use plans.

Other inclusion criteria may be important to a specific local context.

Following identification of an agreed long list of potential sites, they should be evaluated against planning, technical, economic and environmental criteria. A wide range of methods and alternative criteria can be used to evaluate the acceptability of sites. It is important to develop an evaluation checklist for each case, to ensure that it is well suited to the specific local conditions.

An evaluation matrix which uses weighted criteria can be a very effective method of short listing sites. Specific criteria, and the weightings to be assigned to them, need to be developed by the Technical Working Group and approved by the Steering Committee before short-listing. Again, this is to ensure the integrity of the process.

Different evaluators will have different perspectives on the issues which are being evaluated, and will rank sites in a different way. To balance these competing perspectives a number of specialist from a range of different disciplines should independently assess each of the sites, their scores can be averaged.



Possible evaluation criteria include:

Available land area (including potential for future expansion)

Proximity to residential settlements

Proximity to sensitive water resources (eg groundwater wells, aquifers, river, streams)

Soil/land conditions (eg structure/ permeability of soils)

Distance from centres of waste generation

Flooding occurrence

Current land use (eg extent of agriculture or other productive land use; compatibility with surrounding land uses)

Current land ownership (eg Government, private or other)

Site access (availability/quality of access roads)

Cultural and archaeological importance (eg proximity to Mosques, Churches or burial grounds

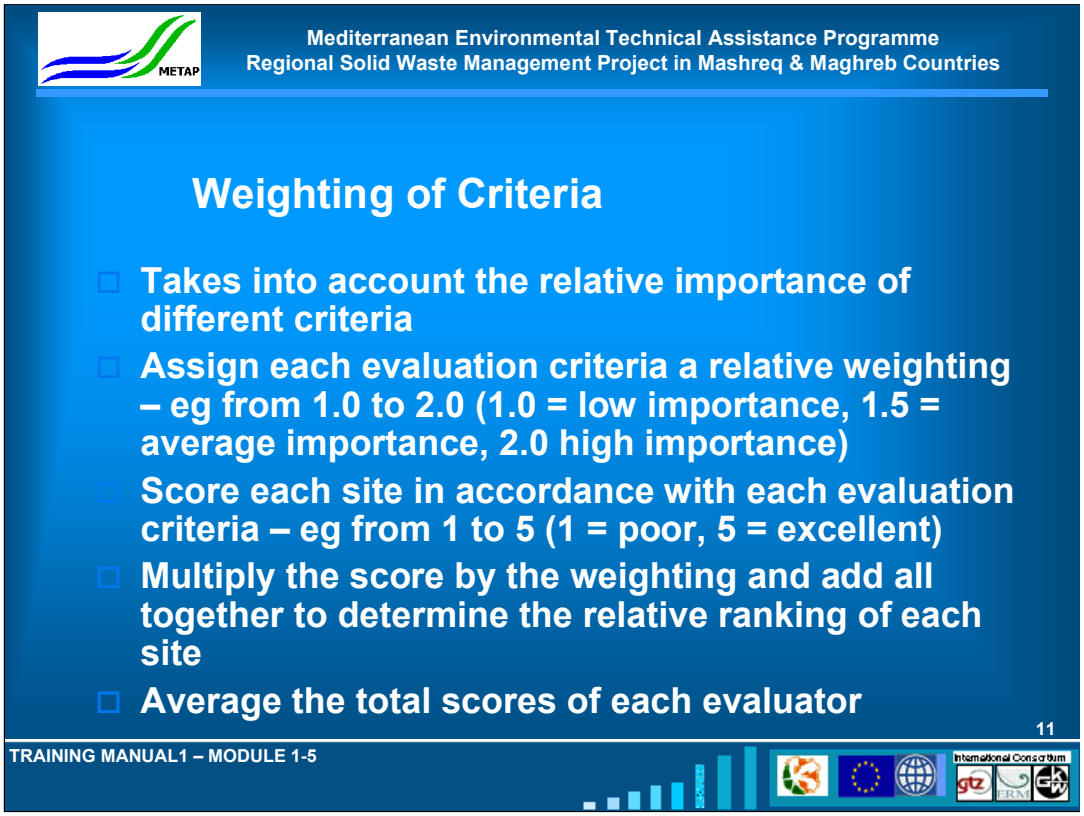
Land stability/ condition (extent of site clearance/ preparation work required)

Topography (quarry (good), valley (good or moderate) flat land (moderate or poor))

Availability of cover material (proximity to current or potential borrow pits)

Availability of support infrastructure (eg water, electricity, sewerage)

Proximity to potential composting/ recycling markets (location in relation to markets/customers



The slides outline a simple but useful evaluation methodology for short listing of sites using weighted criteria.

Each of the evaluation criteria (eg the 15 highlighted on the previous slide) is assigned a weighting – or relative importance.

For example a criteria with relatively high importance (eg proximity to residential settlements) could be assigned a weight of 2.0 – whereas a criteria with relatively less importance (eg availability of support infrastructure) could be assigned a weight of 1.0 – and a criteria of relatively moderate importance (eg proximity to potential composting/recycling markets) could be assigned a weight of 1.5.

The criteria to be used for the evaluation of short listed sites – and their relative weightings – should be determined by the technical working group – and ratified by the steering committee - prior to the site evaluation.

The site evaluation involves a team of specialists from disciplines visiting each of the sites and independently ranking them in accordance with each of the criteria.

Scores of 1 to 5 can be given for each criteria at each site:

1 = poor, 2 = poor/moderate, 3 = moderate, 4 = moderate/good, 5 = good

At the end of the site evaluation:

multiply the score by the weight for each criteria at each site;

add together the weighted scores to give an overall total for each site;

average out the total score for each site given by the evaluators

A worked example is provided in the Report. This may be a useful hand-out to use.

Weighting - Criteria 1

Site	Criteria 1 Weight	Score	Total
Site A	1.8	5	9
Site B	1.8	3	5.4
Site C	1.8	1	1.8

Weighting – Criteria 2

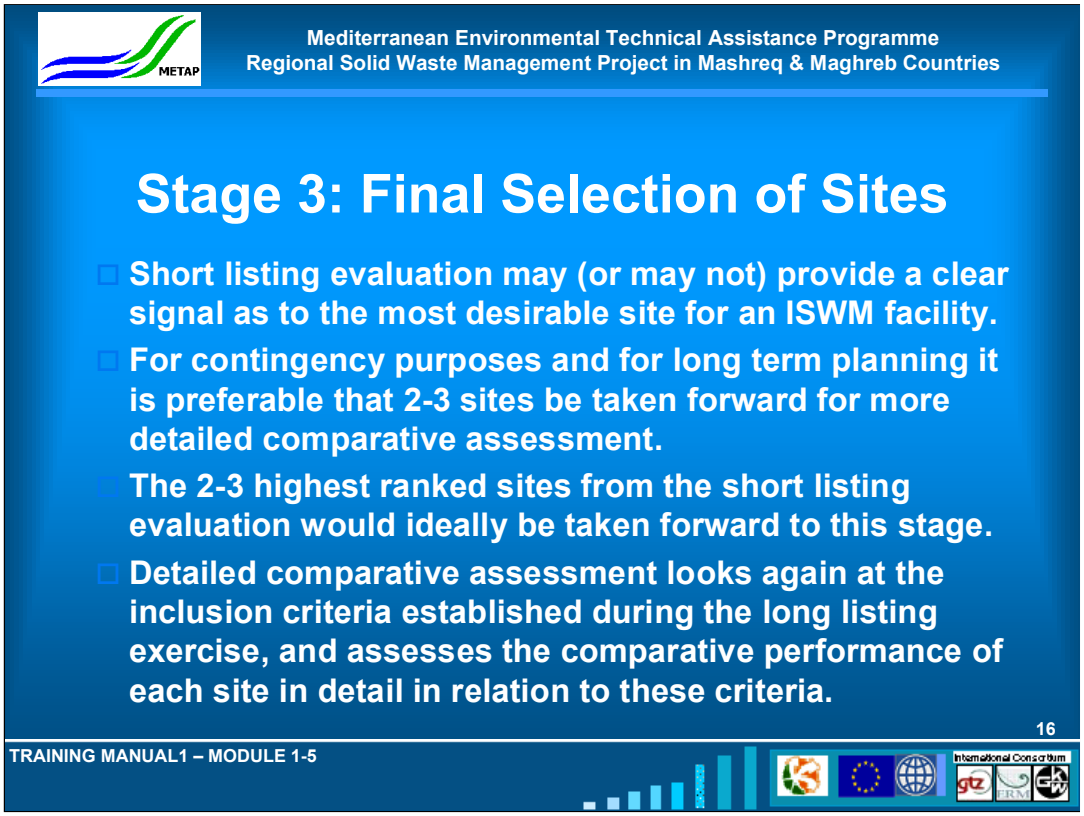
Site	Criteria 2 Weight	Score	Total
Site A	2.0	2	4
Site B	2.0	3	6
Site C	2.0	4	8

Weighting – Totals

Site	Criteria 1 Score	Criteria 2 Score	Total
Site A	9	2	11
Site B	5.4	6	10.4
Site C	1.8	8	9.8

Weighting – Averages

Site	Evaluator 1 – Total Score	Evaluator 2 – Total Score	Average (Rank)
Site A	11	10.4	10.7 (1)
Site B	10.4	9.8	10.1 (3)
Site C	9.8	11	10.4 (2)

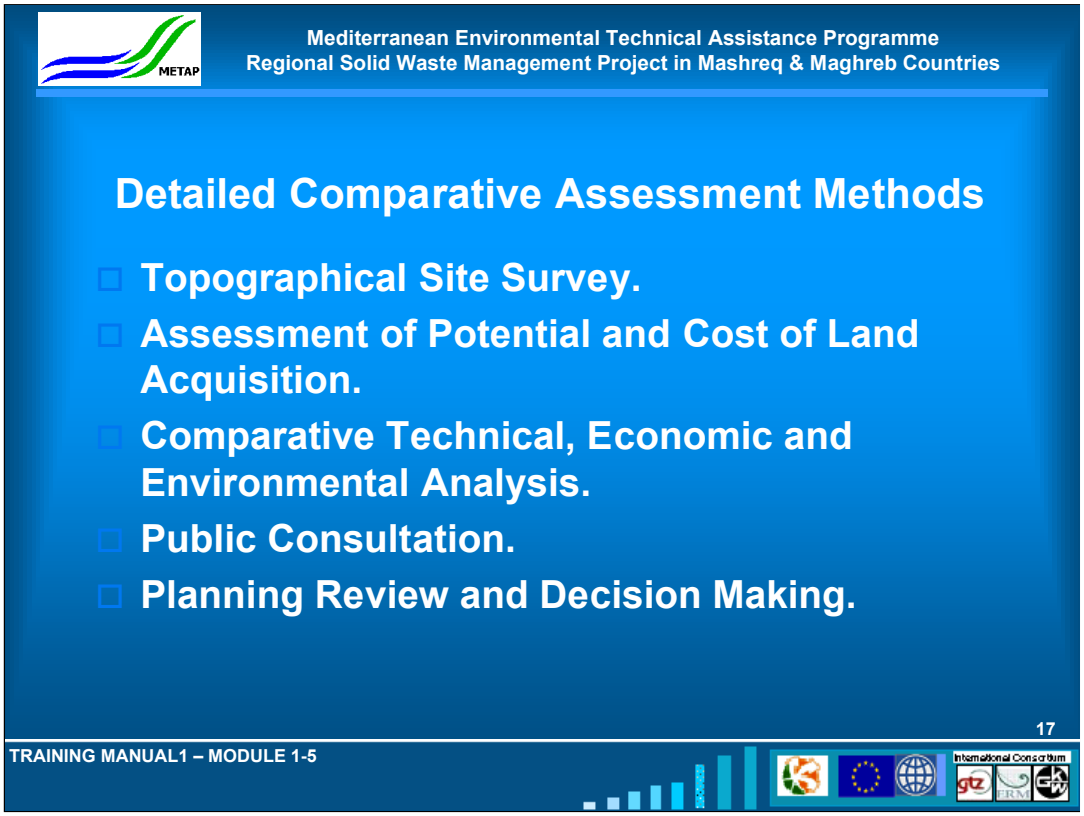


Short listing evaluation may provide a clear signal as to a single most desirable site for an IWTF.

However, for contingency purposes and for long term planning it is preferable that 2-3 sites be taken forward for more detailed comparative assessment.

The 2-3 highest ranked sites from the short listing evaluation would ideally be taken forward to this stage, however the Steering Committee may decide to include one of the lower ranked sites if they consider its merits in relation to a particular criteria to be overwhelming (eg current land ownership).

Detailed comparative assessment looks again at the inclusion criteria established during the long listing exercise, and assesses the comparative performance of each site in detail in relation to these criteria.



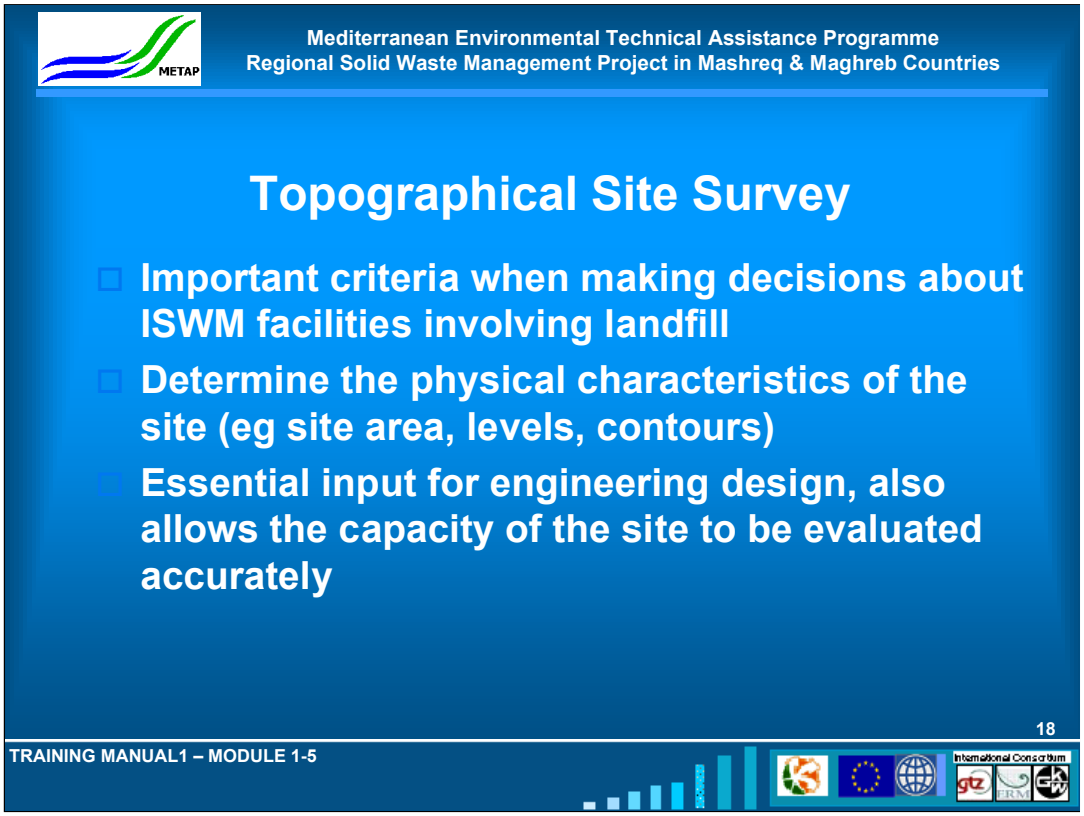
The size of the site should be larger than the minimum area requirement for the construction of the site – **Topographical Site Survey**.

The site should have some possibility for land acquisition – **Land Acquisition Assessment**.

The site should have some possibility for economic and engineering feasibility and environmental protection – **Techno-Economic Analysis and Environmental Assessment.**

The site should have some possibility of being acceptable to neighbouring public **– Public Consultation**.

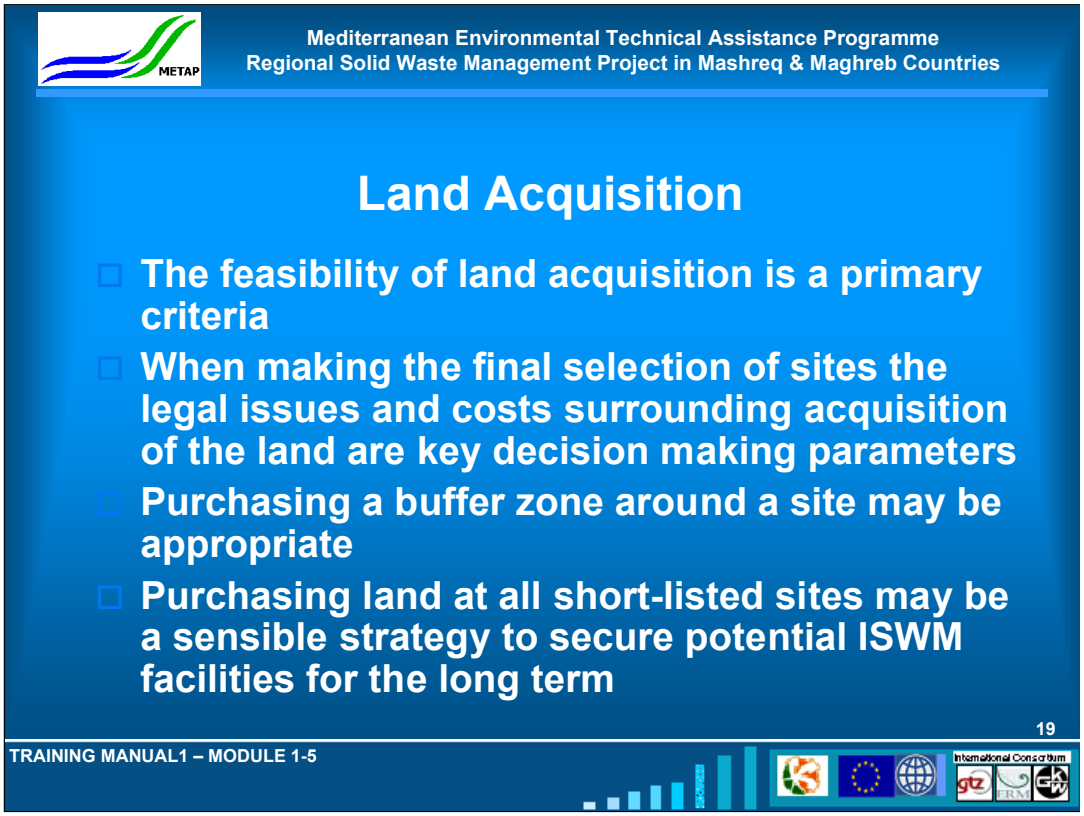
The location of the site should be compatible with wider development priorities, and specific regional development and land use plans **– Planning Review**.



Important criteria when making decisions about ISWM facilities involving landfill

Determine the physical characteristics of the site (eg site area, levels, contours)

Essential input for engineering design, also allows the capacity of the site to be evaluated accurately

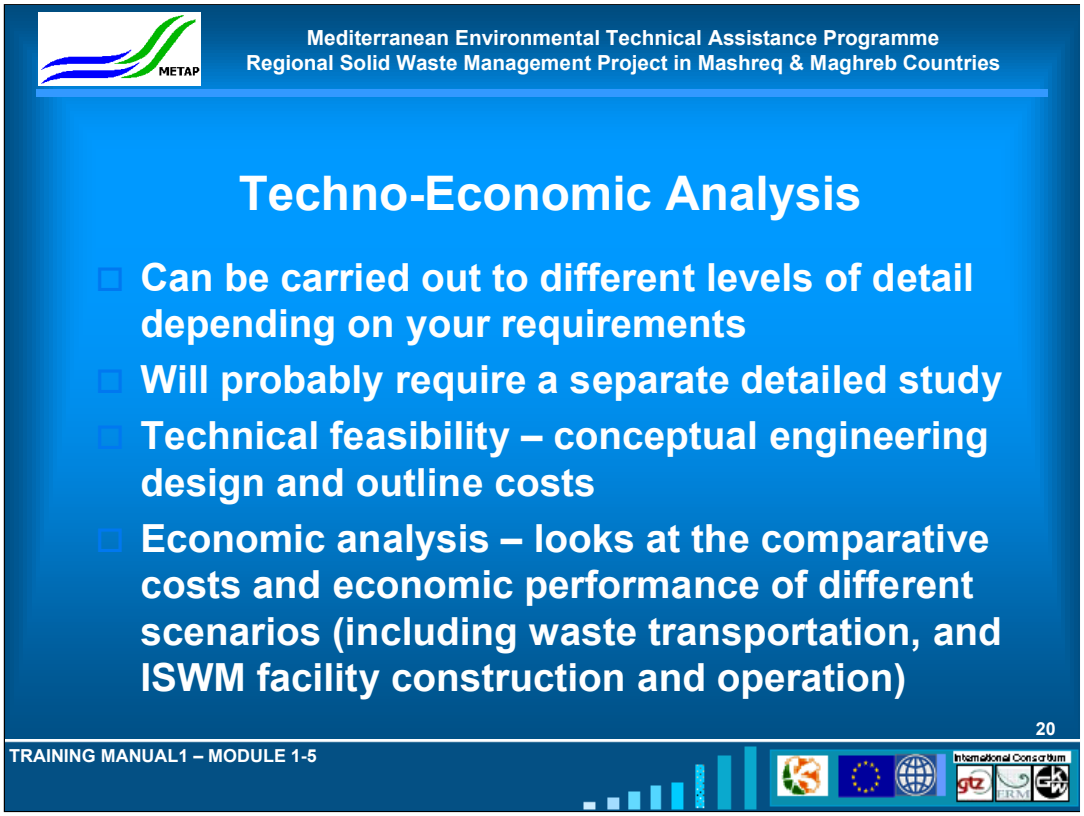


The feasibility of land acquisition is a primary criteria

When making the final selection of sites the legal issues and costs surrounding acquisition of the land are key decision making parameters

Purchasing a buffer zone around a site may be appropriate

Purchasing land at all short-listed sites may be a sensible strategy to secure potential ISWM facilities for the long term.



Can be carried out to different levels of detail depending on your requirements. This will probably require a separate detailed study.

Technical feasibility involves conceptual engineering design and outline costs. Conceptual design consists of a schematic diagram of the proposed facility, including all major components – eg site offices, waste reception area, composting area, sanitary landfill cells etc. The level of detail should be sufficient to prepare an outline cost estimate for the ISWM facility.

The design must respond to the specific characteristics of the site - eg if the site has specific characteristics which will need to be catered for by special engineering works (eg highly permeable strata requiring extra liners to protect groundwater) these should be included.

Economic analysis – looks at the comparative costs and economic performance of different scenarios (including waste transportation, and ISWM facility construction and operation).

A techno-economic model can then be developed to provide comparison of alternative development scenarios. Such models can take into account relative economic impacts of different scenarios.

Input parameters for such models include:

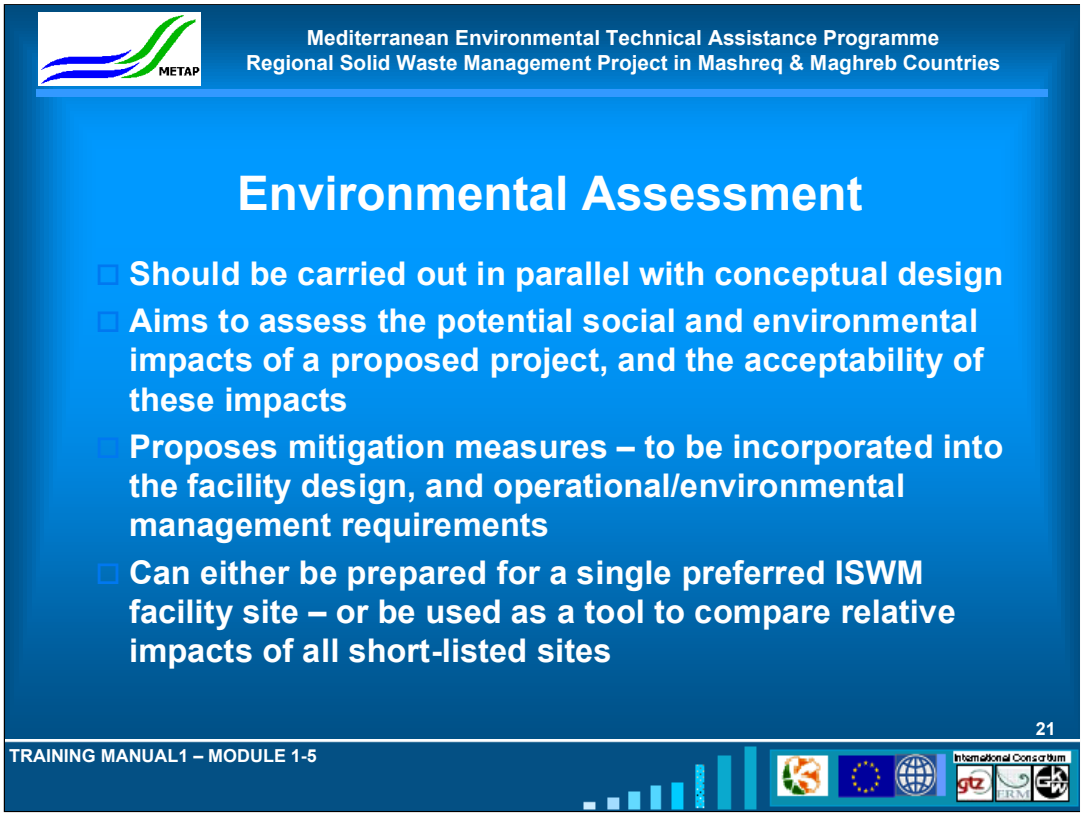
Transportation distances from major centres of waste arisings

Cost per km/per tonne of road transport/transfer of waste

ISWM facility construction costs (including different design standards where appropriate)

ISWM facility operation costs

If well prepared, the techno-economic model can be used as a powerful tool to assist decision making, but remember that it is just a tool.



An environmental assessment is a management tool that can be used for better project planning and design. The overall aim of an EA is to ensure that the environment is considered, in conjunction with other relevant issues.

The EIA should identify, predict and evaluate potential impacts in a systematic, comprehensive and objective way, and the results should be made available to decision makers in a concise and easily understandable manner. Social as well as environmental impacts should be addressed. A worked example of how environmental impacts can be identified, assessed and presented to decision makers is provided

The EIA should seek to make projects successful in five main ways:

underlying natural resource environment is protected;

underlying socio-economic environment is taken into consideration;

project benefits are enhanced;

money is saved through anticipating problems and preventing delays;

projects are more likely to be completed on time.

The EA proposes mitigation measures – to be incorporated into the facility design, and operational/environmental management requirements. A major output of an EA should be an operational management plan – which the managers of the facility must adhere to.

An EA can either be prepared for a single preferred ISWM facility site – or be used as a tool to compare relative impacts of all short-listed sites.

In the case of a comparative EA of several sites, for practical purposes the level of detail, in particular the extent of site investigation, may need to be reduced. More detailed work can follow once a decision on the preferred site has been made. A useful tool for environmental assessment of landfill sites can be found in the *Strategic Planning Guide – Annex 4C.3*.

Detailed technical, economic and environmental evaluation, in tandem with a structured programme of consultation with key stakeholder groups, can ensure that the best, and most acceptable, site is selected for development.

Consulting stakeholders in relation to the proposed development of landfill facilities is strongly advised, and can significantly influence the progress of the project. Such consultation, although unlikely to alleviate many peoples concerns, can:

Provide those who may be affected with the opportunity to raise questions and concerns about the proposed development.

Help project planners to understand, appreciate and deal appropriately with concerns.

Enhance the transparency of the decision making process.

Strengthen the chances of a beneficial outcome to the project and the opportunity for public consensus.

Public consultation observes the rights of citizens to be consulted in relation to a proposed ISWM facility, so that nobody will later be able to claim they have been cheated by `secret' planning.

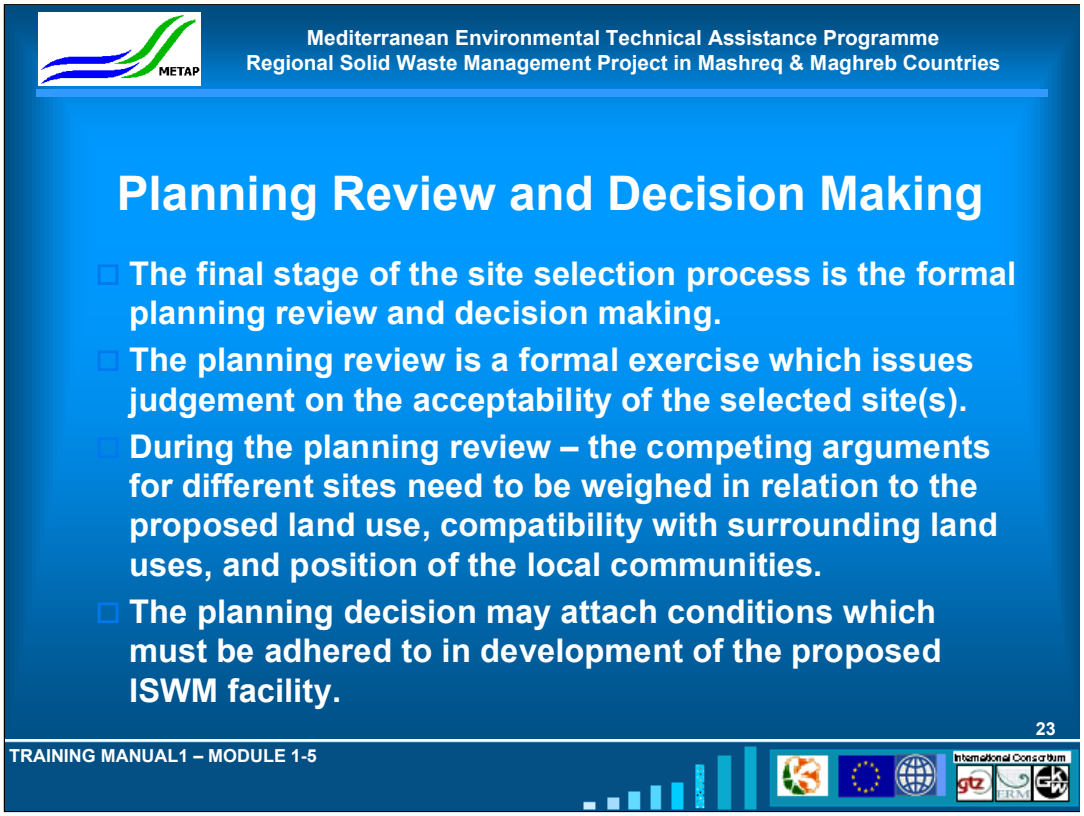
Public consultation enables the views of local people to be heard, and their concerns to be taken into consideration – in political decision making and detailed project design

As a critical step in the ISWM planning process - public consultation needs to be carried out in a formalised manner. Minutes of meetings should be documented, and all efforts made to address the concerns of the public in the project.

Public consultation can be conducted in parallel with, or as part of, an environmental assessment. This provides a mechanism for the concerns of the public to be fed into project design.

Consultation lays a platform for discussions in relation to benefit sharing and/or compensation issues (where appropriate). Benefit sharing relates to establishment of 'host community levies' which in effect represent a payment to the local municipality for improved social services in the area. Compensation relates to specific financial compensation of individuals/families affected by the development.

Public consultation may also lay a foundation for community involvement in supervising the performance of site operations. The 'host' community can be built in as a project partner.



The final stage of the site selection process is the formal planning review and decision making.

The planning review is a formal exercise which issues judgement on the acceptability of the selected site(s).

During the planning review – the competing arguments for different sites need to be weighed in relation to the proposed land use, compatibility with surrounding land uses, and position of the local communities.

The planning decision may attach conditions which must be adhered to in development of the proposed ISWM facility.