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English Version

Drain and sewer systems outside buildings - Management and control of activities - Part 1: General requirements

Réseaux d'évacuation et d'assainissement à l'extérieur
des bâtiments - Gestion et contrôle des activités
opérationnelles - Partie 1: Exigences générales

Entwässerungssysteme außerhalb von Gebäuden -
Management und Überwachung von Maßnahmen - Teil
1: Allgemeine Anforderungen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (FprEN 14654-1:2020) has been prepared by Technical Committee CEN/TC 165 “Wastewater Engineering”, the secretariat of which is held by DIN.

This document is currently submitted to the formal vote.

This document, together with FprEN 14654-3:2020 supersedes EN 14654-1:2014. The general content of EN 14654-1 which is duplicated in EN 14654-2:2013 is included in this document. The specialized text relating to Rehabilitation has been retained in FprEN 14654-2:2020 and the specialized text relating to Drain and sewer cleaning has been moved to FprEN 14654-3:2020.

EN 14654 consists of the following parts, under the general title *Drain and sewer systems outside buildings — Management and control of activities*:

- *Part 1: General*; (the present document)
- *Part 2: Rehabilitation*
- *Part 3: Drain and sewer cleaning*
- *Part 4: Control of inputs from users*

Other parts, dealing with other activities, may be added later.

In drafting this part of EN 14654, account has been taken of other available standards, in particular EN 752, *Drain and sewer systems outside buildings*” and EN 13508 *Investigation and assessment of drain and sewer systems outside buildings*”.

Introduction

Drain and sewer systems are part of the overall wastewater system that provides a service to the community. This can be briefly described as:

- removal of wastewater from premises for public health and hygienic reasons;
- prevention of flooding in urbanized areas;
- protection of the environment.

The overall wastewater system has four successive functions:

- collection;
- transport;
- treatment;
- discharge.

Wastewater can, if necessary after treatment, be discharged to the environment or reused.

Collection and transport of wastewater is provided by drain and sewer systems.

Drain and sewer systems were installed because there was a need to remove the polluted water to prevent diseases.

Traditionally, drain and sewer systems were constructed to collect and transport all types of wastewater together irrespective of the initial source. This led to difficulties in handling the peak flows in times of heavy rainfall and to the introduction of combined sewer overflows, which discharged polluted water to surface receiving water bodies.

It was later recognized that separate systems, where foul wastewater was kept separate from runoff derived from surface water, would be an improvement over such combined systems.

Although many drain and sewer systems started out as combined systems there are strong arguments for considering the separation of foul wastewater and surface water. The pollutant effects are not the same and the separation of effluents allows for the different treatment for each element of wastewater, providing more environmentally friendly solutions.

This concept is included in the approach of integrated sewer management.

This document provides a framework for the design, construction, maintenance, operation and rehabilitation of drain and sewer systems outside buildings. This is illustrated in the upper part of the diagram in Figure 1. This document is supported by more detailed standards for the investigation, design, construction, organization and control of drain and sewer systems.

Investigation and assessment standards include:

- EN 13508 (all parts), *Investigation and assessment of drain and sewer systems outside buildings*

Design and construction standards include:

- EN 16932 (all parts), *Drain and sewer systems outside buildings — Pumping systems*
- EN 16933-2, *Drain and sewer systems outside buildings — Design — Part 2: Hydraulic design*
- EN 1295 (all parts), *Structural design of buried pipelines under various conditions of loading*

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- EN 1610, *Construction and testing of drains and sewers*
- EN 12889, *Trenchless construction and testing of drains and sewers*
- EN 15885, *Classification and characteristics of techniques for renovation and repair of drains and sewers*

Management and control standards include:

- EN 14654 (all parts), *Management and control of activities in drain and sewer systems outside buildings*

To support these detailed standards information comes from specifications produced by individual organizations for their own use. Product standards should also take into account the functional requirements in this document through EN 476, EN 13380 and EN 14457.

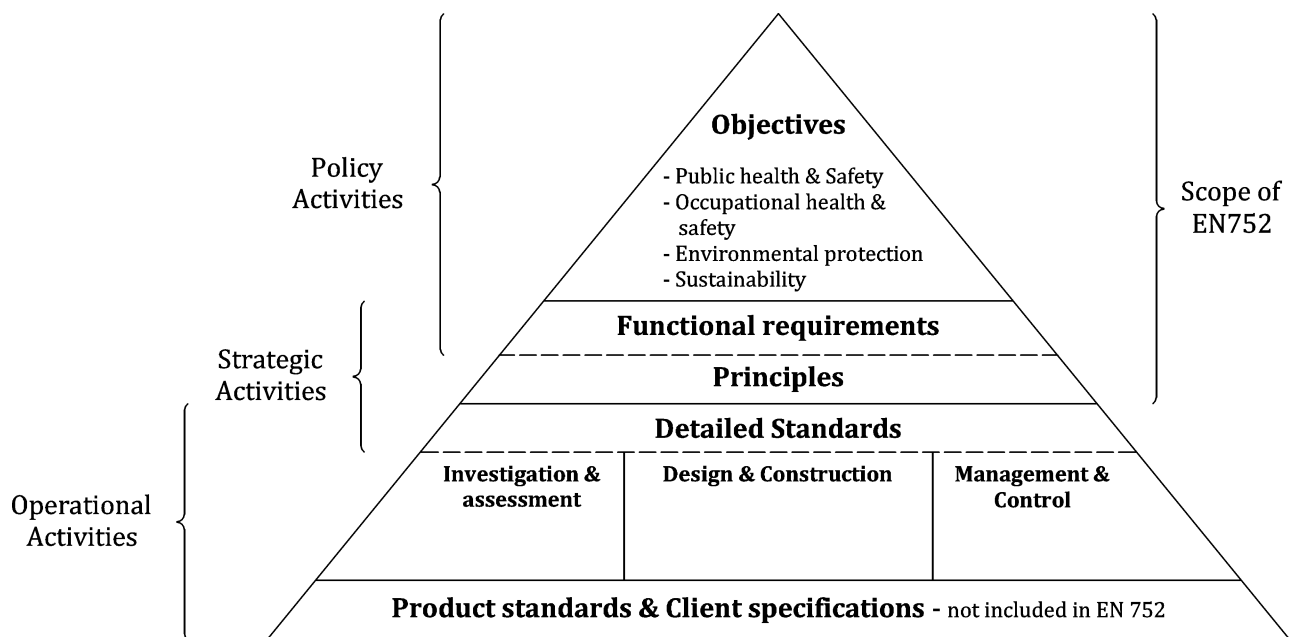


Figure 1 —Pyramid diagram

1 Scope

This document establishes requirements for the management and control of activities in drain and sewer systems outside buildings and specifies requirements for development and implementation of work programmes, and the selection of techniques.

This document covers general requirements for the management and control of activities.

It is applicable to drain and sewer systems from the point where wastewater leaves a building, roof drainage system, or paved area, to the point where it is discharged into a wastewater treatment plant or receiving water body.

Drains and sewers below buildings are included provided that they do not form part of the drainage system of the building.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 752:2017, *Drain and sewer systems outside buildings - Sewer system management*

EN 13508-1:2012, *Investigation and assessment of drain and sewer systems outside buildings - Part 1: General Requirements*

EN 16323:2014, *Glossary of wastewater engineering terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323:2014 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia available at <http://www.electropedia.org/>

NOTE: The following additional terms used in this document are defined in EN 16323:2014:

- drain
- receiving water body
- rehabilitation
- sewer
- sewer system
- surface receiving water body
- wastewater
- wastewater treatment plant

3.1 contractor

organization responsible for implementation of activities on a drain or sewer system

Note 1 to entry: The contractor can be the part of the same organization as the employing authority.

3.2 employing authority

organization that owns or is responsible for the management of a drain or sewer system

4 General

EN 752:2017, Clause 6, outlines the process for preparation and implementation of an integrated drain and sewer system management plan which includes, at a strategic level, a plan for new developments, the operation and maintenance, and rehabilitation of the drain and sewer system and for contingency and emergency planning.

This document sets out a process for implementing the proposals in the integrated drain and sewer system management plan. The process is based on a staged application of the process outlined in Figure 2.

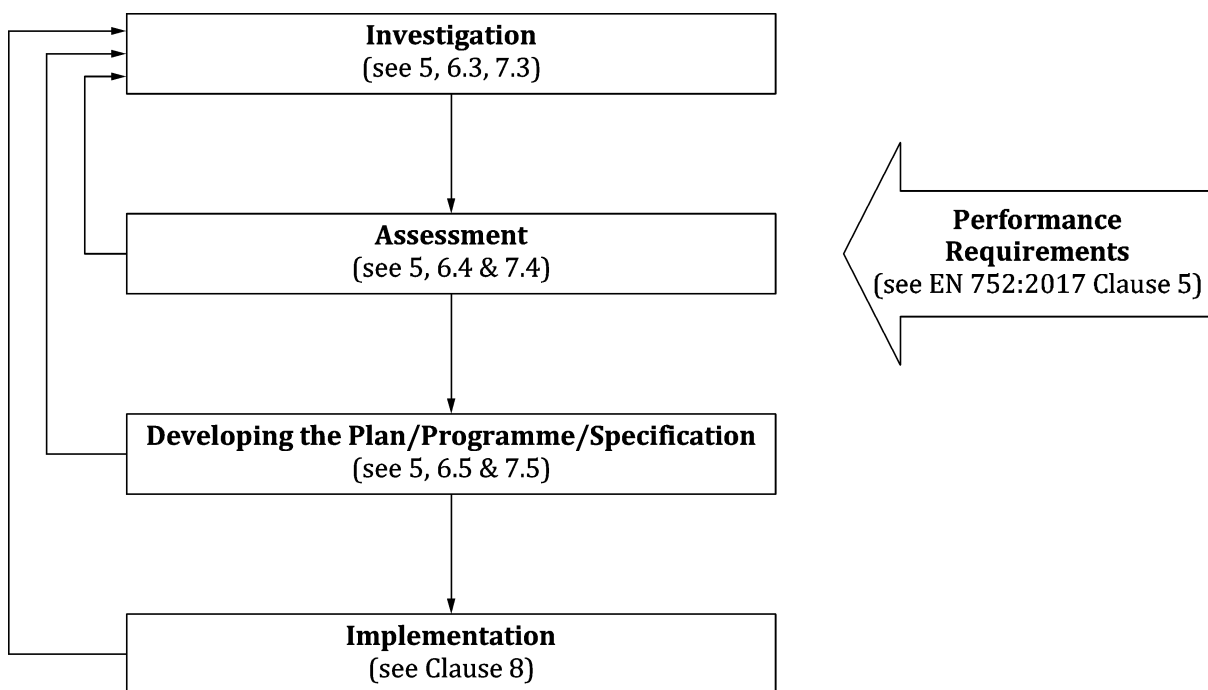


Figure 2 —The integrated sewer system management process (based on EN 752:2017, Figure 5)

The integrated sewer system management process is applied successively to develop programmes based on the integrated sewer system management plan. The programme outlines a series of projects to implement the plan. Following this, the integrated sewer system management process is then used to produce a detailed specification for each of these projects in the programme. Finally, following the implementation of each project, the programme and the integrated sewer system management plan are reviewed and updated where necessary. The performance requirements for the rehabilitated systems should be in accordance with EN 752:2017, 5.2. At each stage further investigation and assessment is carried out in accordance with EN 13508-1.

NOTE In this document “project” refers both to discrete projects and continuous activities.

This staged process is summarized in Figure 3.

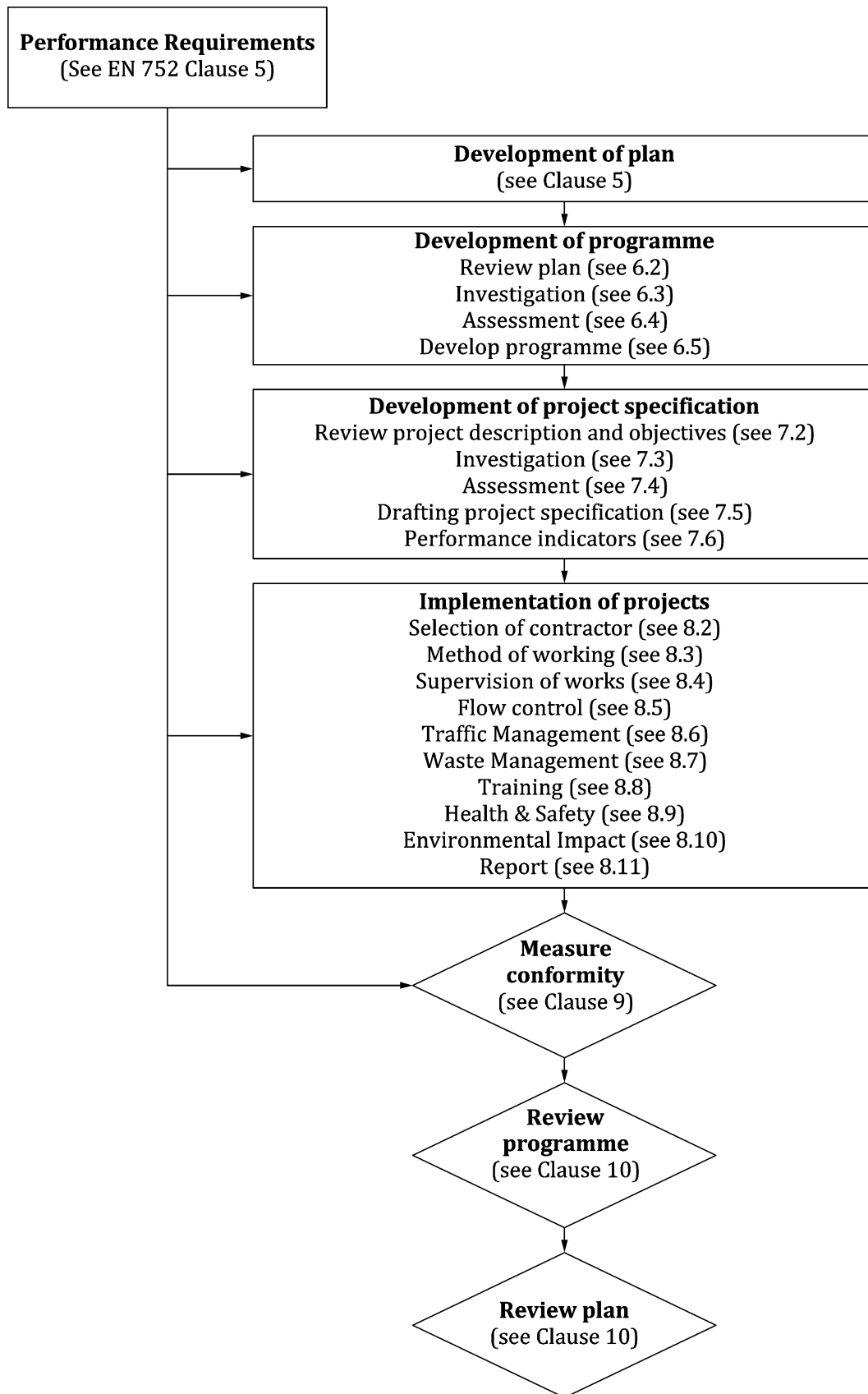


Figure 3 — Summary of the management and control process

5 Integrated Sewer System Management Planning

Prior to implementation of any activities or design of any works EN 752:2017 recommends that an Integrated Sewer System Management Plan is prepared in accordance with EN 752:2017, Clause 6, for the drain and sewer system to achieve the performance requirements in accordance with EN 752:2017, Clause 5. However, this is not always possible if activities are required urgently (e.g. in response to a drain or sewer failure).

The detailed plan does not include detailed descriptions of the solutions. It includes only general descriptions of the approaches to be taken.

The aims of the programmes of activities should be based on the relevant detailed plans in the integrated sewer system management plan.

6 Preparation of programme

6.1 Introduction

The plan does not generally contain the necessary detail to proceed directly to the production of the project specification. The programme defines a series of projects, in line with the plan, to ensure that the drain and sewer system meets the performance requirements. The programme should define the objectives for each project in sufficient detail so that a project specification can then be produced in accordance with Clause 7.

The preparation of the programme involves:

- a) review of the plan (see 6.2) to ensure it is still current and to establish what further investigation is required to develop the programme;
- b) further investigation (see 6.3) to provide the information necessary for the more detailed assessment;
- c) more detailed assessment (see 6.4) to identify further detail of the performance deficiencies that the programme aims to address;
- d) preparation of the programme (see 6.5) setting the scope and objectives for each of the projects.

All stages of the preparation of the programme shall take account of the health and safety principles set out in EN 752:2017, Clause 7.

6.2 Review of the plan

A review should be undertaken of the relevant aspects of the integrated sewer system management plan.

This should include:

- a) ensuring the performance requirements used in the preparation of the integrated sewer system management plan are still current;
- b) checking that any assumptions regarding projected timescales included in the plan for new developments or other changes to the sewer system are still valid;
- c) identifying where further investigation and assessment is required in order to develop the programme of works.

If there have been any changes then the plan should be updated.

6.3 Investigation

The investigation of the drain and sewer system shall be carried out in accordance with EN 752:2017, Clause 6, and EN 13508-1:2012, Clause 5. Details of investigation techniques for existing drains and sewers are described in EN 13508-1:2012.

The scope of the investigations necessary to produce the programme will depend on the extent of the investigations carried out during the preparation of the integrated sewer system management plan. Investigations shall be carried out where further information is required in order to produce the programme.

The types of investigations relevant to each type of activity are listed in the various later parts of this series of standards.

6.4 Assessment

The performance of the drain or sewer systems shall be assessed in accordance with EN 13508-1:2012, Clause 6, using the results of the investigation (see 6.3). The assessments carried out during the preparation of the plan should be reviewed and updated in the light of any new information identified during the investigations. The performance at each planning horizon shall be compared to the performance requirements to identify the needs for work.

The assessment should identify the location of those components of the drains and sewer system where activities are to be proposed. The individual pipeline sections and other components shall be described with the existing information, in order to optimize the programme.

This analysis is carried out using available information including the results of the specific investigations carried out to develop the programme (see 6.3).

The results of the assessment should be checked with the assessment made during the production of the integrated sewer system management plan and if there are significant differences the plan should be reviewed to ensure that it is still valid.

The types of assessment relevant to each type of activity are listed in the various later parts of this series of standards.

6.5 Development of the programme

6.5.1 Introduction

The programme comprises a number of projects which together shall meet the objectives. The programme shall define the scope and objectives of each project in the programme. The programme should include the phasing of the projects including the relationship to any external constraints such as budgets, new developments, and interactions with other utility or development programmes (e.g. highway works). The programme shall take account of the safety principles in EN 752:2017, Clause 7. The programme should specify the classes of solutions to be adopted.

The process of developing the programme is summarized in Figure 4 below.

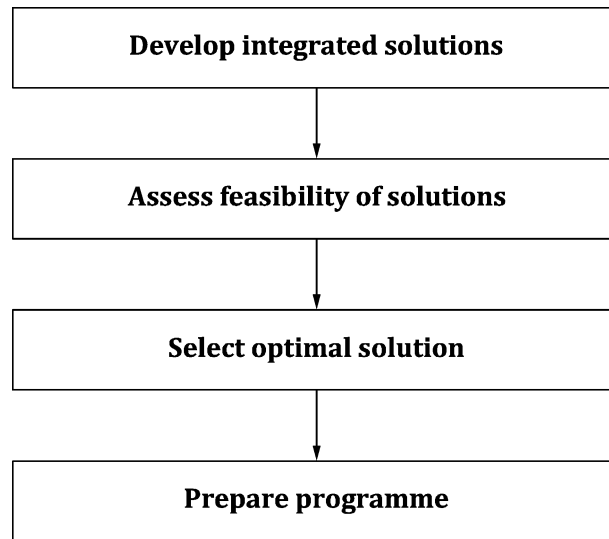


Figure 4 — The solution development process

6.5.2 Specification of objectives

Specific objectives should be established for each project in the programme in accordance with the aims (see Clause 5). These should be expressed as a performance requirement.

Guidance on establishing objectives for each specific type of activity can be found in later parts of this series of standards.

6.5.3 Developing options

To meet the objectives, detailed solutions should be developed in accordance with any current plan for the catchment area. Within this framework a number of feasible options should be developed.

The options can include:

- a) pro-active approaches to reduce the likelihood of performance failures occurring; or
- b) reactive approaches responding to performance failures when they occur. These can include follow-up activities to prevent further occurrence of the same failure in that location.

Where appropriate the options should include solutions that address a number of problems.

Guidance on developing options for each specific types of activity can be found in later parts of this series of standards.

6.5.4 Assess feasibility of solutions

The options developed in 6.5.3 should first be assessed to establish the extent to which they will meet the objectives and minimum performance requirements, and whether it would be feasible to implement them.

All options that meet the minimum performance requirements and that are technically feasible to implement should be taken forward to the next stage.

6.5.5 Select optimum solution

The selection of the most appropriate option shall then take account of a wide range of costs and benefits of each of the options. These should take account of the extent (if any) to which any option

would result in the drain or sewer system achieving more than the minimum performance requirements or providing additional capacity beyond that currently anticipated.

Criteria for assessing the costs and benefits of different options in order to select the optimum solution are given in EN 752:2017, 6.4.3.

6.5.6 Producing the programme

The programme should contain the description of a number of defined projects that are within the framework of the integrated sewer system management plan.

The programme should contain the following information for each project:

- a) objectives including the relevant performance requirements or performance criteria that are to be achieved on successful completion of the project (see 6.5.2);
- b) activities to be carried out and the approach to be adopted;
- c) estimated costs of carrying out the activities;
- d) phasing of the activities;
- e) priorities of the activities;
- f) relationships to other activities;
- g) any legal requirements or permits required to implement the project, including any timescales specified;
- h) social impacts of works on people living in proximity.

Specific guidance on producing programmes for each specific types of activity can be found in later parts of this series of standards.

7 Preparation of the project specification

7.1 Introduction

The project specification should contain all the information, including any drawings, necessary to carry out the project.

The starting point for the preparation of the project specification is the project description and project objectives in the programme produced in accordance with Clause 6 and the performance requirements produced in accordance with EN 752:2017, Clause 5.

The preparation of the project specification involves:

- review of the project description and project objectives;
- further investigation;
- further information and assessment (if necessary);
- producing the project specification.

All stages of the preparation of the project specification shall take account of the health and safety principles set out in EN 752:2017, Clause 7.

7.2 Review of the project description and project objectives

The project description and objectives as set out in the programme should be reviewed to ensure they are still current. Any related new developments or other utility works should be reviewed. Where there have been any changes in the nature or the timing of the development or other works which might impact the project or its phasing the programme should be revised.

The information available should be reviewed to determine what further investigations are necessary in order to produce the project specification.

7.3 Investigation

Guidance on the types of investigations necessary to produce the project specification are listed in the various later parts of this series of standards.

7.4 Assessment

EN 13508-1 gives requirements and guidance on the assessment of existing drain and sewer systems. The assessment should be sufficiently detailed to allow decisions to be taken on the solutions for the project.

Following the completion of the assessment the project objectives should be reviewed to ensure that they are still valid.

7.5 Drafting the project specification

7.5.1 Introduction

As shown in Figure 5, the drafting of the project specification involves the following stages:

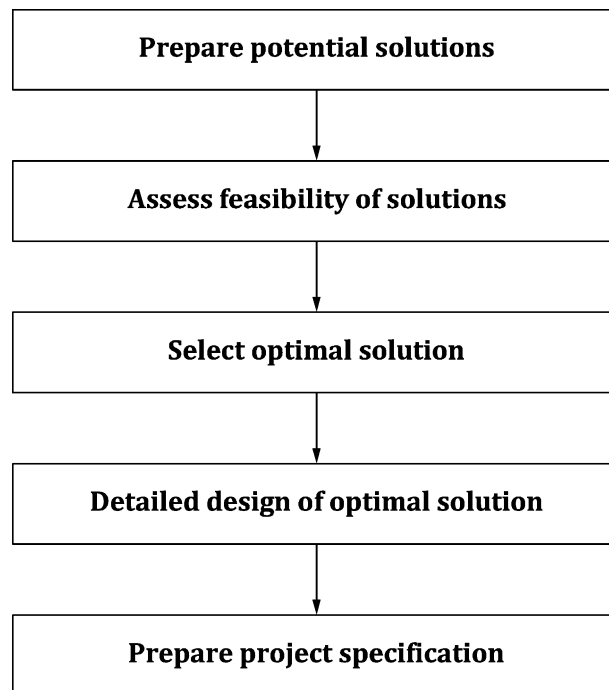


Figure 5 — Detailed solution selection process

7.5.2 Prepare potential solutions

Requirements and guidance on the preparation of potential solution can be found in the later parts of this series of standards.

7.5.3 Assess feasibility of solutions

Requirements and guidance on assessing the feasibility of solutions can be found in the later parts of this series of standards.

7.5.4 Select optimal solution

The options found to be technically feasible should be compared to identify the optimal solution in accordance with the procedure described in EN 752:2017, 6.4.3.

7.5.5 Detailed design of optimal solution

After selection of the optimal solution further detailed calculations should be carried out if appropriate (e.g. providing access, temporary flow management, operating pressure of jetting) and a detailed description of the works should be produced (including drawings or other data where necessary) to provide all the information necessary to carry out the activities.

7.6 Performance indicators

7.6.1 Introduction

Performance indicators should be selected to determine whether the project has:

- a) been carried out in accordance with the project specification; and
- b) achieved the objectives set out in the programme or project.

The performance indicators should be based on easily measurable parameters. They should be used to measure conformity of the completed project (see Clause 9).

7.6.2 Indicators for the assessment of the work quality

Performance indicators should be selected in relation to each of the objectives. Further guidance is given in the various later parts of this series of standards.

7.6.3 Indicators for the assessment of the effectiveness of the project or programme

Further guidance is given in the various later parts of this series of standards.

7.6.4 Prepare project specification

Requirements and guidance on the preparation of project specification can be found in the later parts of this series of standards.

8 Implementation of projects

8.1 Introduction

The implementation of the project shall be carried out in accordance with the principles set out in EN 752:2017, Clauses 9 and 10 as appropriate.

8.2 Selection of contractor

The Public Procurement Directives (2004/18/EC) can apply to the selection of contractors.

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The selection of the contractor should take into account a number of factors, including:

- a) qualifications of the contractor, including:
 - 1) technical competence and experience;
 - 2) health and safety procedures;
 - 3) quality management systems in place;
 - 4) environmental management systems;
 - 5) financial stability;
 - 6) licence to work in the country.
- b) price.
- c) impacts of the proposed method of working, including:
 - 1) proposed resources, including:
 - i) personnel (including management);
 - ii) equipment;
 - iii) materials.
 - 2) management of risks, including minimizing:
 - i) risks to the health and safety of operatives on site and of the public;
 - ii) environmental risks.
 - 3) contract strategy – e.g. a single management contractor with subcontractors, or division of the work between different contracts.
 - 4) social disruption – the disruption to local residents and other members of the public.

8.3 Method of working

The contractor shall agree the method of working with the employing authority.

Further guidance is given in the various later parts of this series of standards.

8.4 Supervision of the works

The supervision of the contractor by the employing authority or their representative should include the following:

- a) ensuring that the contracting company has adequate internal management procedures;
- b) competency of the contractor's supervisors and license (if required);
- c) compliance of the works with the specification;
- d) checking the adequacy of resources and methods of working;

- e) verification of health and safety compliance;
- f) progress of the works in accordance with the programme;
- g) documentation of agreed changes to the contract;
- h) reporting, auditing and documentation of test procedures, test results and performance indicators;
- i) valuation of works and approval of payments;
- j) written confirmation of the satisfactory completion of the works in accordance with the contract;
- k) ensuring that records (e.g. as-built drawings of works) of the activities are produced.

In addition the contractor should supervise the works themselves, including:

- l) progress of the works in accordance with the programme;
- m) dealing with unforeseen incidents;
- n) cost control;
- o) health and safety coordination [The Temporary and Mobile Sites Directive (92/57/EEC) can apply].

8.5 Flow control

Where work is being carried out in existing drain and sewer systems, consideration should be given to measures to control the flow. The need for and extent of such measures will depend on the nature and duration of the works and can include:

- a) use of temporary stoppers to control the flow for short periods;
- b) use of temporary pumps in association with temporary stoppers to pump the flow past the works;
- c) temporary diversion of the flow.

The selection of the appropriate approach will depend on the frequency and magnitude of expected flows, having regard to the expected weather and other factors.

8.6 Traffic management

Where works are carried out in roads, the effect of the works on the traffic shall be considered and measures taken to limit the impact; for example by local traffic control measures such as temporary traffic signals, or installation of traffic diversions via alternative routes.

8.7 Waste management

Measures should be taken to minimize the impact of wastes from the activities. The waste management approach should be in accordance with the following hierarchy:

- a) measures should be taken to minimize the amount of waste produced;
- b) where waste is produced, measures should be taken to reuse as much of the waste as practicable;
- c) where it is not possible to reuse the waste, measures should be taken to recycle as much of the waste as practicable;

- d) where it is not possible to recycle the waste, consideration should be given to the use of the waste for energy recovery;
- e) where none of the options are possible, the disposal of the waste should take account of the environmental impact.

Inappropriate reuse, recycling, energy recovery or disposal of waste can cause environmental damage and endanger public health, and the disposal of wastes can be subject to national legislation. Any restrictions on the reuse, recycling, energy recovery or disposal of wastes shall be detailed in the contract.

8.8 Training

Personnel carrying out the work shall have appropriate training in accordance with EN 752:2017, Clause 11.

8.9 Health and safety

The works shall be carried out in accordance with the health and safety principles described in EN 752:2017, Clause 7.

For example, activities can comprise work on drains and sewers and in confined spaces. Drain and sewer system sites are frequently close to traffic even when using trenchless construction techniques.

In addition there can be hazards related to the specific nature of the works. Further information on the specific hazards associated with different types of work can be found in the later parts of this series of standards.

8.10 Environmental impact

The relevant authority can assess, in the early design phase, the risks to the environment that are inherent to the drain and sewer system activities. Environmental management procedures are described in EN ISO 14001.

It is the contractor's responsibility to ensure on the construction site the control of the risks of environment pollution or disturbance it may generate during its activity.

Further information on the specific environmental impacts associated with different types of work can be found in the later parts of this series of standards.

These risks should be taken into account formally in an Environment Management Plan.

8.11 Reporting

The contractor shall submit a report to the client on completion of the work in accordance with the requirements of the contract. Specific instructions relating to the report, the desired asset information and any data format shall be detailed in the contract.

Where there have been any changes to the work described in the specification this should be detailed. The inventory should be updated where necessary on completion of the works.

9 Measurement of conformity

9.1 General

Materials and components used shall fulfil specified requirements in the corresponding product standards.

The results required will depend on the activity and should be clearly described in the specification, to ensure that the objectives are achieved. The measurement of conformity should be included in the report (see 8.11). The measurement methods depend on the activity.

Further guidance is given in the various later parts of this series of standards.

9.2 Non-conformities

When non-conformities are found, these should be rectified to meet the requirements of the contract.

After an operation has been completed and the non-conformities have been rectified the completion of the work can be agreed by the owner or their representative.

9.3 Post project appraisal

Following the completion of each project, the upgraded system should be assessed using performance indicators (see 7.5) and other measurements to establish whether the objectives of the project, as set out in the programme, have been achieved.

10 Review of plan and programme

The remaining stages of the programme and the plan shall be reviewed:

- a) on completion of a project;
- b) if the performance of the system is significantly different to that anticipated in the programme.

Bibliography

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