

Environmental Surveying and Demolition



THREE GUIDES ON THE DEMOLITION PROCESS

This guide is one of three Værdibyg guides focusing on the value-creating demolition process:

TENDERING OF DEMOLITION PROJECTS

ENVIRONMENTAL SURVEYING AND DEMOLITION

CIRCULAR DEMOLITION

The three guides provide specific recommendations on how to plan, tender and implement demolition projects in connection with development or renovation for the greatest possible benefit to the environment, the work environment and the collaboration between the parties involved.

THE VALUE-CREATING ENVIRONMENTAL SURVEY

Occurrences of harmful substances such as asbestos and PCBs are one of the most frequent causes of delays, extra bills and disputes between clients and contractors on demolition and renovation projects. With good and accurate environmental surveying, the problematic environmental issues can be mapped, described, planned and handled early in the process. The environmental survey thus forms the basis for planning, collaboration and dialogue between the client, the consultant and the contractor throughout the entire demolition project – from the initial design, through tendering to execution.

The purpose of this guide is to clarify how environmental surveying constitutes a value-creating element in demolition and renovation projects. It is often found that the client gives a low priority to environmental surveying in their planning and budgeting of a demolition project, since it can appear to be a costly and time-consuming task that simply prevents the demolition work from getting started. But by using the results of the environmental survey actively and throughout the project, there are significant benefits to be gained – with regard to planning and staying within budget and timetable, health and safety, collaboration between the parties involved, etc.

The value-creating environmental survey provides:

- Accurate studies of the environmental considerations and harmful substances in the existing building.
- Fewer conflicts between the involved parties on how problematic substances should be handled.
- The opportunity for the client to coordinate the work in relation to the work environment and for the contractor to be able to plan their work properly in terms of health and safety before the start of the execution phase.
- Reliable tenders prepared on an informed basis.
- A better opportunity to stay within the budget and schedule.

A good environmental survey can reduce the risk of new issues arising, but it cannot be avoided that harmful substances or similar may be hidden in the structures once the demolition of a building begins. This guide therefore also describes how the involved parties can identify and deal with new issues during the execution phase.

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ENVIRONMENTAL SURVEYING AND DEMOLITION

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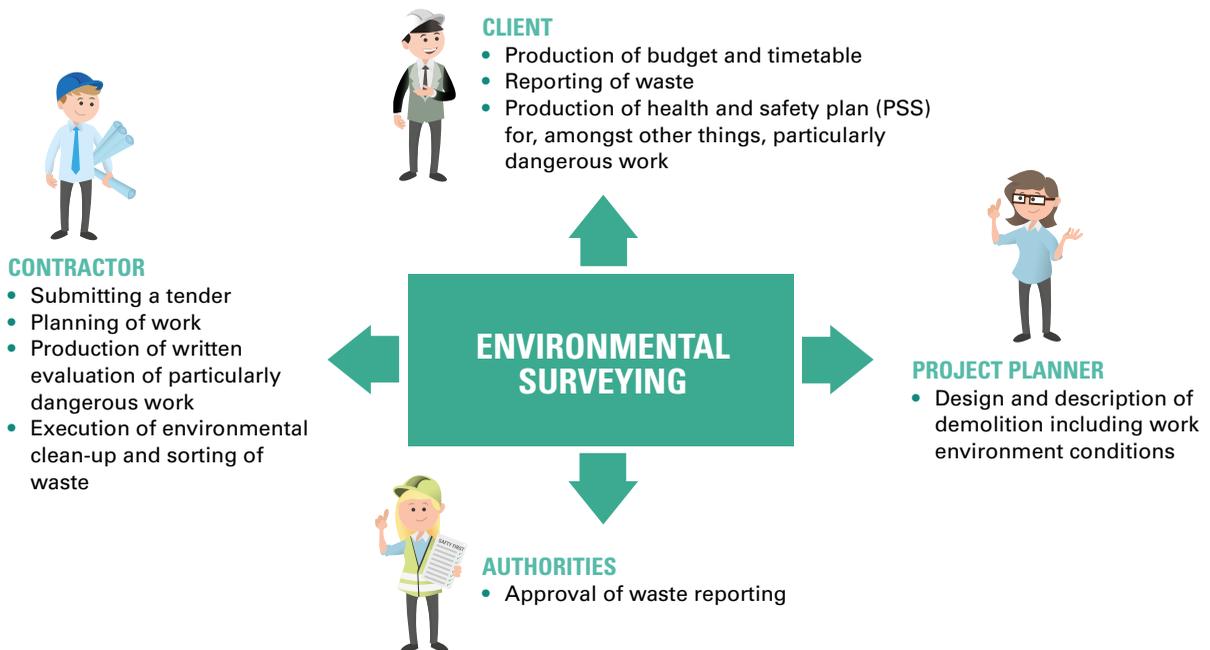
ROLES AND RESPONSIBILITIES WITH REGARD TO ENVIRONMENTAL SURVEYING

In the case of building and construction work (including demolition and renovation), it is the client's responsibility that hazardous waste is identified and reported to the municipality. In order to live up to this requirement, it is necessary with regard to the planning of the demolition work to carry out an environmental survey to register the environmentally harmful substances and materials in the existing building. This also serves to comply with the client's responsibilities with regard to the work environment.

An environmental survey is usually commissioned by the client and is most often carried out by a technical environmental consultant, also called an environmental surveyor, who specialises in the environmental conditions of buildings. The results of the environmental survey can provide useful input to the client, the project planner and the contractor and can support their services with regard to a demolition project.

BE AWARE OF OTHER TYPES OF POLLUTANT

This guide deals with the environmental surveying of buildings and building components. However, it should be noted that there are also other types of pollution and environmental considerations that can affect a demolition project. For example, there can be oil tanks in the ground that have to be removed during the demolition. If there have been leaks in the tanks, there may be oil pollution in the soil around the tanks and in the sewer system on the property. Værdibyg's guide [Forundersøgelser i renoveringsprojekter](#) (in Danish) states a number of pollution issues that should be clarified in terms of the design of renovation projects.



The recipients of the environmental survey and their responsibilities in relation to demolition projects.

THE ENVIRONMENTAL SURVEY ADDS VALUE IN MULTIPLE PHASES

This guide is structured around the different phases of a demolition project, in which the environmental survey plays a crucial role:

PLANNING 	TENDERING 	EXECUTION 
<p>The environmental survey's purpose and scope is clarified</p> <p>The environmental survey is carried out and disseminated via an environmental report</p>	<p>The environmental survey's results are included in the tender documentation and the description of the project</p> <p>The extent of the demolition work is estimated based on the environmental survey</p>	<p>The results of the environmental survey are verified and reviewed in connection with start-up</p> <p>New issues are handled systematically</p>

DEMOLITION AND RENOVATION – TWO SIDES OF THE SAME COIN

This guide deals with the process in and around the environmental survey in connection with renovation and demolition projects. When renovation projects are also included, it is because renovation in the vast majority of cases also involves demolition. So, even though – in contrast to total demolition – parts of the building are typically left behind in connection with renovation, the process and interfaces between the actors in terms of environmental surveying are the same, regardless of whether the demolition is related to renovating a building or if the building is totally demolished. Work environment obligations are also the same.

However, it should be emphasised that when referring to renovation projects in the guide, it only refers to the phase of the project that includes demolition and/or environmental clean-up of (parts of) the existing building. In some cases, it is not possible to handle or encapsulate the environmentally harmful substances identified in the environmental survey. Here, the client must ensure that the occupational health and safety coordinator (P) produces a journal for future repair and maintenance work that describes the known substances that will remain in the building after the renovation.

DEMOLITION REQUIRES PLANNING

During the planning phase leading up to the start of a demolition or renovation project, the crucial foundation stones are laid for the necessary environmental conditions to be surveyed and described so that the contractor can plan the work appropriately and responsibly in terms of the work environment¹ before the work begins. Among other things, the client and the project planner must assess how long the demolition work will take so that it can be carried out in a responsible way in terms of the environment as well as the work environment. A pressed schedule is neither suitable for those who are going to carry out the demolition nor for those who are going to undertake any subsequent renovations.

This is where the client together with their project planner have to decide what environmental surveys are needed in the current project – what has to be investigated and how detailed the surveys should be? If the purpose is clearly defined from the start, the environmental surveyor can prepare a survey that best covers the upcoming project. In this way, the environmental report can be a value-creating tool when the tender documentation has to be prepared and the project is described. This provides the best conditions for accurate offers and a well-planned execution. It can be beneficial to include the occupational health and safety coordinator (P) in this assessment.

CLEAR PURPOSE, COORDINATED TIMETABLE AND ADAPTED SCOPE

Before the environmental survey begins, the client must specify which aims the environmental survey have to meet in order to obtain a result that can be used in the different stages of a demolition or renovation process. Are there, for example, aims that the removed materials must be able to be reused – and are there specific requirements that apply in this regard.

In addition, the client must assess how this is linked to the other planning and design processes and decide when the environmental survey should be carried out. The client must see which parties need the results of environmental survey to be able to carry out the other planning and designing of the demolition project.

Typically, the environmental survey is divided into three phases:

- **Environmental screening:** An initial assessment of the building, if necessary, through an inspection. Taking samples is not always part of a screening.
- **Environmental survey:** A detailed review of the building including taking samples, resulting in an environmental report.
- **Additional studies²:** Further studies of selected issues. For instance, if the goal of the project changes after – or because of – the environmental survey.

The client and the project planner must always consider the purpose and scope of the current environmental survey, and must for instance decide which phases are necessary in the given situation. In large and complex demolition projects, it may be beneficial to carry out an environmental screening initially in order to gain an overview of the task and then afterwards plan and carry out an environmental survey.

HOW MANY TESTS?

There has long been a desire in the industry to clarify how many tests are necessary in order to provide a comprehensive and accurate environmental survey. However, it is difficult to come up with a general recommendation, since the extent, complexity, risk level, etc. of demolition projects vary widely from project to project.

Read more about recommendations regarding the number of tests in DAKOFA's 'Information about' sheet (in Danish).

1 Get more information about the work environment during the planning phase of demolition projects at Videntjenesten on the work environment for clients and consultants at www.byggeproces.dk.
2 See Værdibyg's guide [Forundersøgelser i renoveringsprojekter](#) (in Danish).

In planning, it is necessary to be aware that both the scope and the purpose of the environmental survey can change as the demolition project evolves. The size of the task can change – the project can go from being a renovation to a complete demolition, for example if extensive environmental conditions are identified or if the client’s financial circumstances change. Here, it is important that the new issues in the project are compared with the current environmental survey. Subsequently, it may be necessary to carry out further studies. The environmental surveyor must therefore work closely with the design team.



REMEMBER!



In the planning phase of a demolition project, the following must be clarified:

- What objectives do the environmental survey have to fulfil?
- What are the client’s expectations regarding how complete the environmental survey has to be?
- Are there areas of the building that cannot be examined – for example, if there are residents who will move out later?
- Which parties need information on the environmental considerations in the planning and design phase of the demolition project?

THE ENVIRONMENTAL REPORT FORMS THE BASIS FOR GOOD DIALOGUE

An environmental survey is typically disseminated via an environmental report that contains a number of basic elements such as analysis data, drawings and photographs of sampling sites. In order for the environmental survey to form the basis for a good dialogue between the parties involved in the demolition project, the environmental report should also contain the following descriptive elements:

- A clear indication of the purpose of the environmental survey and which parties have been involved in defining the purpose of the survey.
- Which parts of the building and which construction elements the results of the report apply to.
- Reservations and areas that could not be investigated. As a general rule, an environmental survey is carried out using random sampling since it is rarely possible or appropriate to survey a building completely. Here, it is important that the environmental surveyor clearly states what has been sampled and what has not.
- Input on how the client and the project planner can incorporate the results of the environmental survey into their risk assessment and budget.
- Risk assessment in relation to the work environment for use in the client's health and safety plan (PSS).
- An assessment of the risk of hidden issues – for example, if the building has been renovated or remodelled many times, there is typically an increased risk of hidden environmentally harmful substances that only can be detected as the demolition work is underway.
- Suggestions for additional studies.

HOW IS A GOOD ENVIRONMENTAL SURVEY CARRIED OUT?

Find good advice and guidance on how to perform an environmental survey in the checklist 'The good survey report' (Den gode kortlægningsrapport), published by Videncenter for Cirkulær Økonomi i Byggeriet at vcob.dk.

MAKE USE OF THE ENVIRONMENTAL SURVEYOR'S KNOWLEDGE

The environmental report is a very good tool for dialogue, and by starting with it, information on environmental considerations can be disseminated between the parties in the design phase. The environmental surveyor has a great deal of professional competencies and knowledge about the specific project, which are not brought into play if there is no oral handover to the relevant project partners.

The handover from the environmental surveyor to the project planners and those carrying out the work is a significant factor in how the other collaboration, dialogue and the project's execution are carried out and should therefore be agreed early³. The occupational health and safety coordinator (P) should participate in the handover.

³ See also Værdibyg's guides [Samarbejde og kommunikation i renoveringsprojekter](#) (in Danish), [Starting Right](#) and [Establishing Collaboration](#).

THE ENVIRONMENTAL SURVEY IS TRANSLATED IN THE TENDER DOCUMENTATION

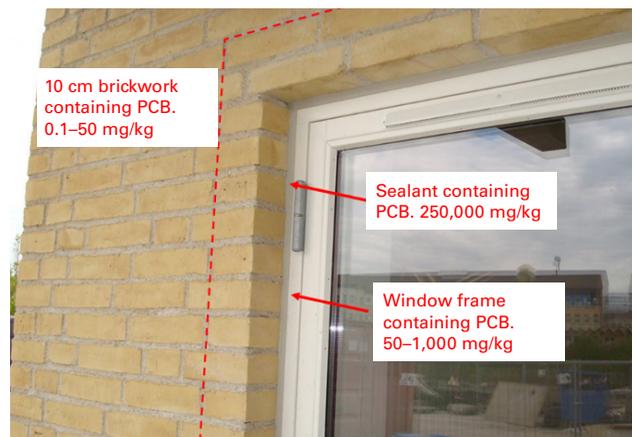
In order to create as much value as possible in the execution of the demolition project, the environmental survey must be translated into a complete description in the tender documentation. It is not enough to just attach the environmental report as an appendix! The results and conclusions must be incorporated into the descriptions so that there is consensus between the environmental report and the tender documentation. This creates the best basis for the contractor to be able to price the necessary work in the most accurate way in their offer. In order for the project planners to be able to draw on the environmental surveyor's knowledge and experience, there must be a good collaboration between the design team and the environmental surveyor. It can be beneficial for the environmental surveyor to participate in design meetings etc.

When the environmental survey results are to be incorporated into the tender documentation, it is important to be aware of whether the results have been interpreted in the environmental report. The environmental survey is most often carried out as random samples, and it is therefore important that the results are interpreted and that assessments are made of the extent to which the tests are generally applicable. For example, if a sample is taken from a wall, it must be assessed whether the test results can apply to all walls of the same material.

In addition, the tender documentation must specify what the performance requirements and documentation requirements are for the execution. There can be specific requirements for carrying out particularly critical work. For example, requirements for the use of specific methods for cleaning contaminated surfaces or cleaning checks after the environmental clean-up is finished. It must be clear whether the tender documentation contains requirements or suggestions regarding the contractor's freedom of method.

VISUALISATIONS GIVE PRECISE JOB DESCRIPTIONS

In the tender documentation, it can be beneficial for text to be supplemented with sketches and photographs that illustrate where the harmful substances are found and in what pollution levels. This can also be a great help when information about occurrences of problematic substances need to be translated into easy-to-understand job descriptions of what actually needs to be done in the project.



Example of a visual description in tender documentation.

EXACT QUANTITIES OR ESTIMATED SIZE?

To price the project correctly, it is necessary that the contractor knows the size of the work. An indication of size must also ensure fair and equal competition between tenderers if several contractors submit tenders for the project.

There are different approaches to how the size of the work is described and how detailed the project is quantified during the tender phase. There are both advan-

tages and disadvantages to the different approaches, and the degree of detail depends to a large extent on how comprehensive the environmental survey has been prior to the tendering process.

The client and the project planner can choose to measure or calculate the exact quantities for all environmental remediation work and state this in a detailed tender list where all work is quantified. The client thereby ensures that the contractors calculate their tenders on a uniform basis. This approach can be time-consuming and require a very thorough environmental survey covering all relevant environmental considerations in the building elements that need to be handled.

If quantities for environmental clean-up work are not known to a precise extent, AB 18 generally recommends that the contractor is paid according to the number of units actually used. Alternatively, the client and the project planner can choose to specify estimated quantities in the tender list. This can, for example, be based on a survey of a single apartment in a large apartment complex. The actual quantities are calculated jointly by the client, project supervisor and contractor in connection with a subsequent verification phase.

DRAWINGS AND PHOTOGRAPHS PROVIDE OVERVIEW

To help the contractors calculate their tenders, it can in many cases provide a good overview when the extent of contaminated building elements is indicated on floor plans and/or sectional drawings as well as in photos.

STIPULATED SERVICES TO BE USED AS REQUIRED

Since unforeseen environmental conditions often arise in connection with carrying out a demolition or renovation, it can be a good idea to have a tool to deal with this. Here, stipulated services in the tender list can be used.

Stipulated services are services in the tender list that only come into play if there is a need for the service in connection with carrying out the project. The stipulated services can be used to cover services that you are not aware of during the design phase but which the

project planner expects may arise during the project.

Stipulated services are generally considered to be useful to have in the tender list. Since an environmental survey cannot be completely comprehensive, and unforeseen issues often emerge during the execution phase, stipulated services are a good way to stay one step ahead of these issues.

By pricing the issues mentioned in the environmental report and the usual services often found in environmental clean-up and demolition projects, the largest unexpected surprises can be avoided. The pricing of stipulated services can also assure the client that additional work has been subject to competition.

The appendix at vaerdibyg.dk contains a list of suggestions for stipulated services that can be included in the tender list.

REMEMBER!



In connection with the preparation of the tender documentation, the client must clarify the following:

- Are the studies that have been carried out still adequate for the project or have new issues emerged?
- Should additional studies be arranged for some of the issues that have been difficult to describe in the tender documentation?
- Are there unknown issues that the contractor should be informed about already in the tender documentation?
- Who is responsible for the preparation of descriptions of environmental and working conditions in the tender documentation?
- Are the interfaces between environmental clean-up and the subsequent project described? This is a particular point to pay attention to in renovation projects, where other tradesmen have to take over the building after the environmental clean-up.
- Are the environmental surveyor and occupational health and safety coordinator (P) involved in a timely and sufficient manner?

COLLABORATION IN THE EXECUTION PHASE

It is when the demolition or renovation begins that good collaboration must pass the test, and it is here where the vast majority of conflicts arise if there is not good dialogue between the parties.

The demolition work is often one of the first things to happen on a construction site, and often another team of workers is waiting to get started after the demolition. Time is therefore often a very critical factor that can put pressure on the parties involved and thus also challenge the good collaboration between the parties.

A number of specific activities and tools where the environmental survey results actively come into play can support good collaboration during the execution phase:

- A verification phase
- Start-up meeting before execution begins
- Systematic handling of new issues

QUANTITIES AND TENDERS ARE SPECIFIED IN THE VERIFICATION PHASE

A verification phase provides a good opportunity to bring the contractor's experience and knowledge into play before starting the actual work. Here, the client and the contractor – potentially together with the project planner and the environmental surveyor – clarify quantities and uncertainties in the tender documentation descriptions and tender lists before the project begins.

The verification phase is a period of typically 1–2 weeks immediately after the contract is signed with the contractor, where the contractor and the project planner, based on the environmental survey, review quantities on the site and agree on the exact scope in the tender list, after which the contract price is adjusted. An impartial third party may be used, for example a quality assurance specialist, to verify the quantities.

In addition, supplementary studies can be arranged and carried out during this period. The method helps to clarify quantities and supplementary services – and uncertainties in general – as well as to adjust the contract price at an early stage, which has a positive effect on collaboration and communication in the project.

VERIFICATION OF QUANTITIES:

- The demolitionist and the project planner verify the quantities together.
- The need and scope of supplementary studies are agreed.
- The tender price is adjusted by the corrected quantities and prices.

It should be noted that, in the verification phase, issues can be uncovered that the chosen contractor is not able to handle. In the tender documentation, it must be described how such issues are handled⁴. For example, there can be very particular contamination issues that require special equipment for proper removal. In addition, the tender documentation must specify whether the contractor is paid according to the verified quantities or according to the quantities actually carried out.

KNOWLEDGE SHARING AT THE START-UP MEETING

In order to pass on relevant information from the environmental survey, it is important that the environmental surveyor participates in the start-up meeting with the demolition contractor and presents results, reservations and other relevant information that the environmental surveyor has gained insight into during their examination of the building.

At the start-up meeting, the contractor carrying out the project will have the opportunity to ask questions to the person or persons who have carried out the environmental survey. Here, questions can be asked about unresolved issues that are crucial to examine before the work is carried out. It can be beneficial to combine the start-up meeting with the occupational health and safety coordinator's (B) start-up meeting on the work environment with all the contractors working on the site.

⁴ See also Værdibyg's guide [Tendering of Demolition Projects](#)



CLEAR PROCEDURE FOR HANDLING NEW ISSUES

In almost all demolition projects, unforeseen situations arise when you begin to tear down and remove building elements. This can, for instance, be concealed asbestos ducts set in the wall or floor structures consisting of several types of flooring laid on top of each other. The handling of new and unforeseen issues during the execution phase are often a source of conflict. To address this, it is a good idea to have a procedure for how new issues are handled. The procedure for handling new issues should be described in the tender documentation.

It can be an advantage for a procedure for handling new issues to include:

- The contractor immediately informs the client, a procedure for further communication is agreed and quick action is initiated.
- A joint review is held at the construction site as well as a subsequent building meeting to clarify the issues. The occupational health and safety coordinator (B) should also participate.
- In the event of disputes, an impartial party can be appointed who can help with finding a resolution⁵.

REMEMBER!

During the execution phase, the following must be clarified:



- How is environmental clean-up documented before further renovation or demolition?
- Who is responsible for reporting and documenting the construction waste?
- What is the procedure when some 'unknown' pollution appears?
- How does the demolition contractor get in contact with the environmental surveyor if there are questions about the environmental report?

⁵ See Værdibyg's guide [Mediation & Conciliation](#).