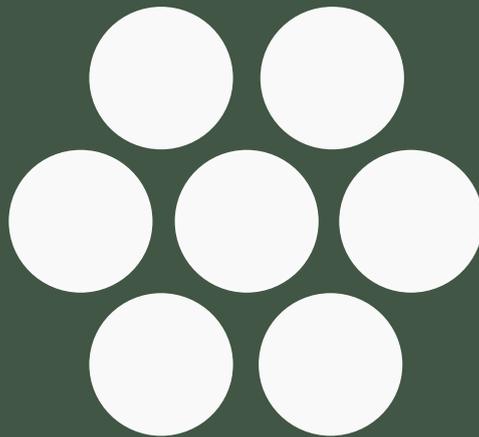
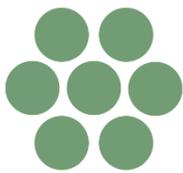


# INSTRUCTIONS ROBUST FIBRE

## Sub-Appendix 7.1 - Fibre Infrastructure Deployment Project

*Version 1.8*





# **INSTRUCTIONS ROBUST FIBRE**

## **Sub-Appendix 7.1 - Fibre Infrastructure Deployment Project**

Version 1.8

# Content

1. Introduction .....	5
2. Reference Material .....	6
3. Design Process Overview .....	7
<b>3.1 General .....</b>	<b>7</b>
<b>3.2 Design Process .....</b>	<b>7</b>
<b>3.3 Stage gates (BP) in the Design Process .....</b>	<b>8</b>
4. Feasibility Study .....	9
<b>4.1 When May Network Design Require a New Site? .....</b>	<b>9</b>
<b>4.2 Measures in the Feasibility Study .....</b>	<b>9</b>
4.2.1 Area and Connection Analysis .....	9
4.2.2 Collection of Background Information.....	10
4.2.3 Coordination and Information Sharing .....	10
4.2.4 Preliminary Technical Solution .....	10
4.2.5 Assessment of Site Impact.....	11
4.2.6 Permits, Land Access and External Dependencies...	11
4.2.7 Cost Assessment and Benefits .....	11
4.2.8 Outcome of the Feasibility Study .....	12
5. Preliminary Design .....	13
<b>5.1 Measures in the Preliminary Design .....</b>	<b>13</b>
5.1.1 Topology and Network Structure .....	13
5.1.2 Mapping and Route Planning .....	13
5.1.3 Cable and Duct Planning.....	13
5.1.4 RSA and Robustness Assessment .....	13
5.1.5 Building Permits and Regulatory Matters .....	14
5.1.6 Assessment of Site Impact (Detailed).....	14
5.1.7 Schedule and Budget Basis .....	14
5.1.8 Outcome of the Preliminary Design .....	14
6. Detailed Design .....	16
<b>6.1 Measures in the Detailed Design.....</b>	<b>16</b>
6.1.1 Design of Ducting and Routes .....	16
6.1.2 Design of Fibre Cables and Splicing.....	16

<b>6.1.3 Installation Techniques and Materials .....</b>	<b>16</b>
<b>6.1.4 Documents and Plans .....</b>	<b>17</b>
<b>6.1.5 Coordination with Site (where applicable) .....</b>	<b>17</b>

# 1. Introduction

The purpose of this appendix is to provide consolidated and practical guidance for the design of robust and operationally reliable fibre networks within backbone, distribution and access areas. The instruction describes principles and requirements for planning, dimensioning and design of the passive infrastructure – from ducting and fibre cables to splice points, distribution points and connection points.

The document is intended for municipal networks, network owners, contractors and consultants working with new construction, expansion or reconstruction of fibre installations. The content is based on established industry recommendations such as Robust Fibre, PTS guidelines, relevant SS-EN standards and ITU-T recommendations. If the project includes public co-financing, the authority requirements for infrastructure shall also be considered.

The instruction covers the entire process from needs identification and planning to completed project documentation and constitutes a common framework with clear requirements, stages, control points and recommended measures. Design of fibre networks shall always be carried out with consideration to applicable legislation, including requirements under the Cybersecurity Act (CSL) and the Electronic Communications Act (LEK), and with a focus on robustness, availability and traceability.

The design of fibre networks is closely linked to the configuration of the physical sites where active equipment is installed. This appendix addresses the design of the passive infrastructure, while the complementary Sub-Appendix 7.2 – Site Deployment Project describes requirements and configuration for technical areas, power supply, climate, security and physical access. The preliminary design shall, in projects where the site is affected, conclude with the necessary site prerequisites being established before procurement begins.

By applying both Sub-Appendix 7.1 and 7.2, a unified design process is ensured which results in robust, scalable and long-term operationally reliable fibre networks with good conditions for future capacity expansion, maintenance and change management.

## 2. Reference Material

### Relevant legislation:

- *Electronic Communications Act (SFS 2022:482)*
- *Cybersecurity Act (SFS 2025:1506)*
- *PTS/MCF to be introduced during 2026*
- *Act (2016:534) on Measures for the Expansion of Broadband Networks*
- *Planning and Building Act (PBL)*
- *Boverket's Building Regulations (BBR)*
- *Environmental Code*
- *Utility Easements Act*
- *Electrical Safety Act*
- *Work Environment Act*

### Industry standards:

- *ITU-T G.652D, G.657A – Fibre standards*
- *AMA Anläggning*
- *AB04/ABT06/ABK09*

### Guidelines and instructions:

- *Robust Fibre – Appendix 2 Robust Networks*
- *RDI – Facilities with Enhanced Security – Appendix 2 Passive Secure Physical Connection*
- *RDI – Threat Catalogues and RSA*
- *PTS Guidelines for Broadband Support*

## 3. Design Process Overview

### 3.1 General

The design process for fibre networks in accordance with this sub-appendix covers the entire chain from needs identification to completed and commissioned installation. The process shall ensure that the network is planned, dimensioned and designed in a manner that meets requirements for robustness, operational reliability and cybersecurity in accordance with applicable standards and relevant legislation.

In the design phase, the client shall also identify whether the project affects any existing site or whether there is a need to establish a new site as part of the network's function. This does not mean that a site shall always be built, modified or procured, but only that the network design shall clarify whether site-related matters need to be addressed.

Any site measures – modification of an existing site, new establishment or no measures at all – are handled in accordance with Sub-Appendix 7.2. If the project does not affect any site, this shall be documented in the feasibility study or the preliminary design, and 7.2 shall then not apply.

### 3.2 Design Process

The design process comprises the following stages:

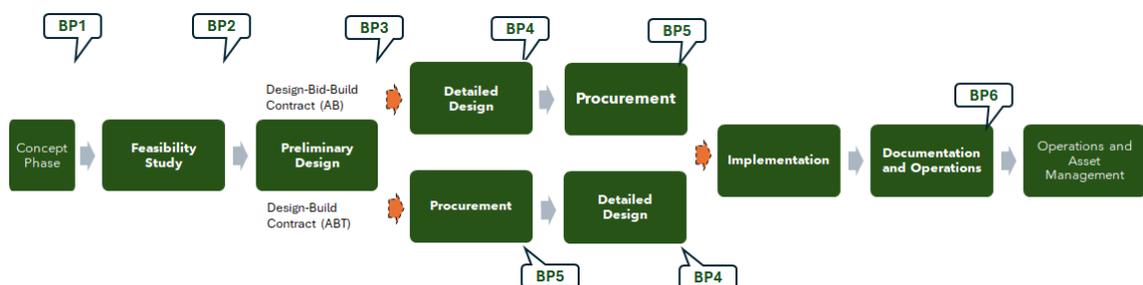


Image. Sub-processes and decision points

The concept phase aims to identify the need for new construction or expansion of fibre networks. The phase leads to a decision to initiate a feasibility study (BP 1). No technical decisions are made in the concept phase, but possible impact on existing sites shall be noted for further analysis.

1. **Feasibility Study:** assesses whether the project is justified and defines needs, scope and basic prerequisites.
2. **Preliminary Design:** develops the principal network structure, identifies whether sites are affected and establishes the technical framework for continued design.
3. **Detailed Design:** establishes the final technical solution (AB) or reviews the contractor's technical solution (ABT).
4. **Procurement:** procures fibre construction works and any site measures, if included in the project.
5. **Implementation:** installation and construction in accordance with the design documents, including quality and security controls.

6. **Documentation and Operations:** handover to operations with complete documentation.

The feasibility study and the preliminary design shall also identify whether the project:

1. Does not affect any site,
2. Affects an existing site (capacity, connections, physical environment),
3. Requires modification of an existing site, or
4. Requires establishment of a new site.

Only in alternative 3-4 shall design in accordance with Sub-Appendix 7.2 be initiated. The assessment shall be documented at the end of both the feasibility study and the preliminary design.

### **3.3 Stage gates (BP) in the Design Process**

BP (Decision Gate) refers to the formal stage approval within the project governance model.

The design process includes the following stage gates:

#### **BP 1 – Start Decision**

Decision to initiate the feasibility study.

#### **BP 2 – Approved Feasibility Study**

Decision to proceed to preliminary design. It shall be stated at this stage whether the project is likely to affect any site.

#### **BP 3 – Approved Preliminary Design**

At BP 3 the following shall be established:

- the principal network structure,
- whether the project does not affect any site,
- whether the project affects an existing site,
- whether the project requires modification or establishment of a site,
- whether site measures shall be procured separately or together with the network (in the case of ABT).

If no site is affected by the continuation of the project, this shall be documented and no site design shall be carried out.

#### **BP 4 – Approved Detailed Design**

For AB: the client approves the design documents.

For ABT: the client approves the contractor's detailed design.

#### **BP 5 – Contract Signed**

A contract is signed with the contractor. Site measures are included only if the project comprises such measures.

#### **BP 6 – Approved Final Inspection / Handover to Operations**

## 4. Feasibility Study

### Purpose

The feasibility study shall ensure that the project is justified, feasible and aligned with the network owner's objectives regarding robustness, capacity, cost-efficiency and future development.

The feasibility study shall also clarify whether the project affects existing sites or requires new sites, ensuring that the correct design pathway is selected in subsequent stages.

### 4.1 When May Network Design Require a New Site?

#### 1. Construction of a New Network

When a completely new fibre network is established, one or more new nodes are normally required to enable backbone, distribution and access functions. A new site is required when the area lacks an existing node structure or when distance, attenuation requirements or redundancy principles cannot be fulfilled using existing sites.

#### 2. Expansion of an Existing Network

When an existing network expands, a new node point may be required in order to:

- relieve load from existing sites,
- create redundancy,
- fulfil capacity requirements, or
- connect new geographic areas.

A new site shall be established when existing technical facilities cannot meet functional or capacity-related requirements.

#### 3. Restructuring of the Network, for example in connection with the introduction of new technology

Technology transitions such as PON, XGS-PON or changes in attenuation budget, split points, redundancy requirements or network architecture may require the establishment of new nodes. This may also include relocation of functional points within the network or the creation of separate operational zones based on cybersecurity requirements.

**In all cases, the functional requirements and topology of the network shall govern the need for a new site. The decision to establish a new site may therefore only be made following analysis in the feasibility study and shall be formally established at BP 3.**

### 4.2 Measures in the Feasibility Study

In the feasibility study, the designer shall carry out the following activities:

#### 4.2.1 Area and Connection Analysis

- Define the geographical scope of the project.
- Identify the number of potential connections (households, businesses, public entities).
- Identify any mission-critical users (e.g. municipal operations).

- Identify adjacent networks and possible connection points to the higher-level network.
- Investigate the possibility of publicly funded broadband expansion.

#### **4.2.2 Collection of Background Information**

- Investigate planned reinvestment needs.
- Collect and analyse municipal planning documents:
  - detailed development plans
  - comprehensive plans
  - planned development areas
- Identify other utility owners and road authorities in the area.
- Map existing infrastructure in the area: ducting, power networks, water and wastewater, telecom.
- Investigate ground conditions and any potential contamination.
- Identify geographical obstacles: rock, watercourses, roads, railways, etc.
- Take into account:
  - Geographical protection areas – for example nature reserves, water protection areas and shoreline protection.
  - Cultural environments – for example church environments or areas of national cultural heritage interest.
  - Historical remains – for example burial mounds, stone settings, rune stones, milestones or historic stone bridges.
  - Biotopes and natural habitats – avenues of trees, stone walls, wetlands, natural meadows and pastures or protected vegetation.

#### **4.2.3 Coordination and Information Sharing**

- In the feasibility study, the designer shall consider the requirements under the Act on Measures for the Expansion of Broadband Networks.
- Network operators may, under certain conditions, be obliged to make information on planned and ongoing projects available via the PTS broadband deployment portal.
- The feasibility study shall therefore include an assessment of:
  - whether the project is subject to statutory information obligations,
  - whether publication or coordination via the PTS broadband deployment portal is applicable,
  - whether coordination opportunities with other actors may reduce costs, disruption or environmental impact.

#### **4.2.4 Preliminary Technical Solution**

- Prepare a preliminary proposal for the network's technical solution (PON, AON, redundancy principles).
- Develop an initial topological outline including:
  - backbone level

- distribution level
- access level
- Identify potential locations for node points and street cabinets.
- Make an initial assessment of attenuation budget and fibre requirements.

#### **4.2.5 Assessment of Site Impact**

For each node point required in the project, the designer shall assess:

- whether there is an existing site in the area,
- whether the site is functionally affected (new backbone fibres, capacity increase, colocation of other operators, new connections),
- whether the network requires new technical space or minor modification of an existing site,
- whether there are alternative options to connect via another existing node or station.

The assessment shall result in one of the following:

1. The project does not affect any site.
2. The project affects an existing site but requires no construction.
3. The project requires modification of an existing site (Sub-Appendix 7.2 Chapter 11).
4. The project requires establishment of a new site (Sub-Appendix 7.2 Chapters 4–7).

Only in cases 3–4 shall the project proceed with site design in accordance with Sub-Appendix 7.2.

#### **4.2.6 Permits, Land Access and External Dependencies**

- Identify the need for land rights agreements.
- Identify whether building permits may be required for a potential new site or street cabinet.
- Identify the need for consultation with the Swedish Transport Administration, municipality, county administrative board and others.
- Assess the timeline and risks depending on external approvals.
- Identify any implementation restrictions during execution, for example if night work is required on heavily trafficked roads, or if recreational areas must remain accessible during certain periods of the year, such as beach parking areas during summer.

#### **4.2.7 Cost Assessment and Benefits**

- Prepare an initial cost estimate based on topology, route lengths and identified needs.
- Perform a benefit analysis for the project area.
- Identify potential joint trenching opportunities that may reduce costs.

#### **4.2.8 Outcome of the Feasibility Study**

The feasibility study shall result in:

- a preliminary technical solution,
- a topological outline,
- an assessment of site impact and decision on whether further design under Sub-Appendix 7.2 is required,
- a preliminary cost and benefit analysis,
- an identified risk profile and uncertainties,
- a recommendation regarding continuation of the project.

#### **BP 2 – Approved Feasibility Study**

# 5. Preliminary Design

## Purpose

The preliminary design shall develop the feasibility study into a more defined technical and geographical basis for procurement, budgeting and decision-making. It shall also determine whether and how site-related matters need to be addressed in the continued design process.

## 5.1 Measures in the Preliminary Design

### 5.1.1 Topology and Network Structure

Topology and network structure shall be established. Requirements and principles for backbone, distribution and access networks differ regarding redundancy, node structure, robustness and impact in the event of outages.

In publicly funded deployments, requirements in accordance with the funding authority's instructions must be fulfilled.

The preliminary design shall clearly define which topology each part of the network belongs to and which architectural principles are applied.

- Establish the definitive principal topology for:
  - national and regional networks
  - distribution networks
  - connection networks
  - access networks
- Establish principles for network redundancy.
- Establish required node points and functional connections.

### 5.1.2 Mapping and Route Planning

- Prepare location maps with preliminary routes, including trench corridors.
- Identify alternative alignments where obstacles exist.
- Determine suitable locations for ducts and chambers.

### 5.1.3 Cable and Duct Planning

- Prepare preliminary cable drawings indicating fibre count per cable.
- Prepare preliminary duct drawings.
- Assess the need for:
  - microducts versus main ducts
  - chambers, street cabinets and distribution points
- Prepare high-level quantity calculations.

### 5.1.4 RSA and Robustness Assessment

- Update the Risk and Vulnerability Analysis (RSA) with identified risks, dependencies and critical points.
- Identify routes requiring specific protective measures.

- Assess restoration time in the event of an outage.

### **5.1.5 Building Permits and Regulatory Matters**

In the preliminary design phase, the designer shall identify and compile all building permit, regulatory and consultation matters that may affect the implementation, schedule or cost of the project.

This shall include at a minimum:

- identification of affected road authorities (municipal, state, private),
- identification of required land rights agreements, easements and REV numbers,
- identification of permits required for crossings of roads, railways, watercourses and other obstacles,
- identification of required permits and/or consultations regarding biotopes, natural and cultural environments, shoreline protection or other environmental interests,
- assessment of whether building permits may be required for street cabinets, technical buildings or sites.

Uncertainties shall be managed through early dialogue with the relevant authorities or landowners. The outcome shall form the basis for the schedule, risk assessment and the decision at BP 3.

### **5.1.6 Assessment of Site Impact (Detailed)**

The designer shall now carry out a more detailed assessment of site-related matters:

- Is the existing site sufficient in terms of space, power supply, cooling and accessibility?
- Are minor adaptations required to accommodate new backbone fibres?
- Is a new site required based on technical requirements, distance or redundancy principles?
- Is the site issue entirely irrelevant (for example, connection to an existing backbone without establishing a node)?

The outcome shall be classified as:

1. No site is affected – concluded
2. Existing site is affected – handled under Sub-Appendix 7.2 Chapter 11
3. New site required – design initiated in accordance with Sub-Appendix 7.2 Chapters 4–7

### **5.1.7 Schedule and Budget Basis**

- Prepare a realistic schedule for the entire project.
- Update the cost estimate based on quantities and permit assessments.

### **5.1.8 Outcome of the Preliminary Design**

The designer shall deliver:

- complete principal topology,

- map of planned routes,
- preliminary cable and duct drawings,
- updated Risk and Vulnerability Analysis (RSA),
- assessment of site impact,
- updated budget,
- recommendation regarding continued design and/or procurement.

**BP 3 - Approved Preliminary Design**

# 6. Detailed Design

## Purpose

The detailed design shall produce all technical documents required for construction in the case of a Design-Bid-Build contract (AB) and review the contractor's detailed design in the case of a Design-Build contract (ABT). This stage includes site-related projects only if BP 3 has established that site matters are relevant.

The activities in the detailed design phase shall be regarded as an integrated whole and do not need to be carried out in strict chronological order. The sequence of work shall be adapted to the project's prerequisites, permit processes and external dependencies.

The designer shall ensure that prerequisites such as land agreements, road authority permits and approved routes are verified before final cable and construction documents are established, in order to avoid redesign and delays during the construction phase.

## 6.1 Measures in the Detailed Design

### 6.1.1 Design of Ducting and Routes

Detail plan all duct routes, including depth, method, obstacles and crossings.

Specify trench width, cover depth and marking materials.

Establish the placement of chambers, distribution points, street cabinets and poles.

Prepare clear sections and detailed drawings.

The designer shall ensure that required permits and agreements are identified and managed for all designed routes, including:

- permits from relevant road authorities,
- land rights agreements, easements and REV numbers,
- permits and/or consultations for crossings of watercourses, biotopes and environmentally sensitive areas.

The design shall be based on approved or verified routes. If permits have not yet been granted, this shall be clearly stated in the design documents.

### 6.1.2 Design of Fibre Cables and Splicing

- Prepare final cable drawings and fibre counts for each section.
- Prepare the final splice plan for each chamber, street cabinet and site.
- Establish ODF panel configuration, fibre addressing and labelling.
- Verify the attenuation budget against actual lengths and components.

### 6.1.3 Installation Techniques and Materials

- Establish duct types, dimensions and quantities per route.
- Specify installation method (trenching, ploughing, directional drilling, etc.).
- Prepare specifications for chambers, cabinets, labelling and cable protection.

#### **6.1.4 Documents and Plans**

- Prepare construction drawings and technical specifications.
- Establish the Health and Safety Plan, Environmental Plan and Traffic Management Plan.
- Prepare control plans for the construction phase.

#### **6.1.5 Coordination with Site (where applicable)**

If site-related matters are included in accordance with BP 3, the designer shall:

- ensure that duct routing and penetrations correspond with the site layout,
- consider distances, cable congestion and fire protection requirements,
- coordinate power supply, grounding and fibre routing towards the ODF.

#### **BP 4 – Approved Detailed Design**

# 7. Procurement of Construction

## Purpose

To ensure that the network is procured and constructed in accordance with established requirements, standards and security provisions. Site-related matters are included only if BP 3 and BP 4 have established that the project includes site measures.

## 7.1 Form of Procurement

- Divided contract
- General contract
- Coordinated general contract

## 7.2 Form of Contract

- Design-Bid-Build (AB) → construction documents shall be completed.
- Design-Build (ABT) → functional requirements shall be clearly defined.

## 7.3 Measures for Procurement

### 7.3.1 Preparations

- Ensure that bills of quantities and drawings are complete.
- Establish whether the procurement includes only the network or also site-related measures.
- Ensure that all prerequisites regarding land agreements and permits are secured.

### 7.3.2 Tender Documents (FU)

#### ***In the case of a Design-Bid-Build contract (AB):***

- administrative provisions (AF),
- complete construction documents (drawings, technical descriptions, permits),
- bills of quantities,
- health, safety and environmental requirements,
- RSA requirements, including:
  - requirements for the contractor's participation in risk-reducing measures,
  - requirements that identified risks are considered in planning and execution,
  - requirements for reporting deviations affecting the risk profile,
- documentation requirements,
- any site documentation (only if the project includes site measures).

The tender documents shall include or refer to all known permits, land agreements and consultations affecting the execution of the contract.

If permits, land agreements or consultations have not yet been granted, this shall be clearly stated in the tender documents.

The tender documents shall specify:

- which permits are pending,
- how these affect the schedule and execution,
- whether the contractor or the client is responsible for the application process,
- how risk and any cost consequences are managed within the contract.

**In the case of a Design-Build contract (ABT):**

- administrative provisions (AF),
- functional and performance requirements for the network (framework description, technical description),
- technical principles and boundary conditions,
- requirements for robustness, redundancy and security,
- health, safety and environmental requirements,
- RSA requirements, including:
  - requirements for the contractor's participation in risk-reducing measures,
  - requirements that identified risks are considered in planning and execution,
  - requirements for reporting deviations affecting the risk profile,
- documentation requirements,
- any functional requirements for site (only if applicable).

In ABT contracts, no construction documents or bills of quantities shall be included in the tender documents other than as indicative material, unless explicitly stated otherwise.

**Clear Allocation of Responsibilities in the Tender Documents**

The tender documents shall clearly state the applicable form of contract and the contractual status of documents and information.

In Design-Bid-Build (AB), construction documents and quantities shall constitute contract documents.

In Design-Build (ABT), documents attached as indicative material shall be clearly marked as non-contract documents.

The tender documents shall further clarify the allocation of responsibility regarding permits, design, verification and documentation.

**7.3.4 Contract and BP 5**

- A contract shall be signed with the contractor.
- Site-related measures are included only if this is stated in the tender documents.

**BP 5 – Contract Signed**

## 8. Implementation

### Purpose

The implementation phase shall ensure that the fibre network is constructed in accordance with established design documents, requirements for robustness and security, and with full traceability prior to handover to operations.

### 8.1 Preconditions Prior to Construction Start

Before construction commences, the following shall be ensured:

- a contract has been signed (BP 5),
- required permits, land agreements and consultations have been granted or managed in accordance with the contract,
- a Health and Safety Plan has been established and a BAS-U has been appointed,
- Traffic Management Plans (TA plans) have been approved where required,
- a start-up meeting has been conducted with relevant key personnel,
- utility location requests in Ledningskollen have been submitted prior to excavation works,
- construction start has been notified to affected landowners and permitting authorities.

### 8.2 Execution of the Contract

Construction shall be carried out in accordance with:

- contract documents,
- approved construction documents or functional requirements,
- Robust Fibre,
- applicable legislation, permits and health and safety requirements.

The contractor is responsible for:

- establishing the work site in accordance with applicable permits,
- performing excavation, duct installation, cable installation, splicing and termination in accordance with the documents,
- carrying out required measurements and internal quality controls,
- documenting executed work continuously, including photographs and site diary,
- managing changes and deviations in accordance with the contract (variations and amendments).

Hantering av ändringar, tillägg och avgående arbeten (ÄTA)

Vid genomförande av entreprenaden ska hantering av ändringar, tillägg och avgående arbeten (ÄTA) ske enligt fastställd och spårbar process. Syftet är att säkerställa tydlighet, rättssäkerhet och korrekt ekonomisk reglering.

Följande principer ska tillämpas:

- Alla ÄTA-arbeten ska initieras genom skriftlig underrättelse från entreprenören till beställaren.
- Underrättelsen ska lämnas via överenskommen kommunikationskanal, exempelvis:
  - förutbestämd e-postadress, eller
  - projektportal eller ärendehanteringssystem, om sådant används i projektet.
- Underrättelsen ska tydligt beskriva:
  - orsaken till ändringen,
  - teknisk omfattning,
  - konsekvens för tid, kostnad och funktion,
  - hänvisning till berörda handlingar eller förutsättningar.
- Beställaren ska besvara underrättelsen inom överenskommen tid, varvid underrättelsen:
  - godkänns,
  - avslås, eller
  - begärs kompletterad.
- Först efter skriftligt godkännande får ÄTA-arbete utföras, om inte annat följer av tvingande säkerhets- eller driftsskäl enligt avtal.
- Muntliga underrättelser eller muntliga överenskommelser ska inte anses giltiga och får inte ligga till grund för ÄTA-reglering.
- Samtliga godkända ÄTA ska dokumenteras och regleras enligt avtalade ekonomiska principer och redovisas samlat vid reglering.

### 8.3 Execution, Controls and Inspection

During and after execution, the following shall be carried out:

- internal quality controls shall be performed and documented,
- required compliance checks and, where applicable, interim inspections shall be conducted,
- a final inspection shall be carried out including review of documentation,
- survey data and as-built documentation shall be delivered in accordance with the contract,
- final reporting and completion reporting shall be performed.

#### BP 6 - Approved Final Inspection and Handover to Operations

**Not.** BP 6 is a single decision gate described in both Chapter 8 and Chapter 9 from different perspectives. In Chapter 8, BP 6 refers to the approved final inspection of the construction works, while in Chapter 9 it refers to completion of documentation and handover to operations. BP 6 shall be considered achieved only when both aspects have been fulfilled.

# 9. Documentation

## Purpose

To ensure that the installation is fully documented and traceable for operations and asset management.

## 9.1 Documentation and Handover to Operations

- Compile and quality-assure documentation, for example GIS data, fibre measurement protocols, photographs and ODF schematics.
- Ensure that the documentation complies with the Robust Fibre guidelines and the client's requirements.
- Register new routes, sites and areas of interest in Ledningskollen.
- Deliver the documentation, including all permits, land agreements, measurement protocols and internal quality controls, in the agreed structure and format to the client.
- All documents shall be available in the documentation management system.
- Hand over the installation with complete documentation to the operations organisation.

### BP 6 – Approved Final Inspection and Handover to Operations

**Not.** BP 6 is a single decision gate described in both Chapter 8 and Chapter 9 from different perspectives. In Chapter 8, BP 6 refers to the approved final inspection of the construction works, while in Chapter 9 it refers to completion of documentation and handover to operations. BP 6 shall be considered achieved only when both aspects have been fulfilled.

# 10. Operations and Asset Management

## Purpose

Operations and management of the installation shall be carried out in a manner that maintains operational reliability, quality and traceability.

## 10.1 Measures for Operations

- Establish procedures for monitoring, fault rectification and preventive maintenance.
- Establish service agreements with defined response times and allocation of responsibilities.
- Document and communicate planned measures and upgrades.
- Manage additional routes and customers.
- Update GIS systems and contract registers.
- Maintain up-to-date documentation following each change.
- Administer easements, lease agreements and operational agreements, including monitoring validity periods and conditions.
- Review the Risk and Vulnerability Analysis (RSA) annually or in the event of major changes to the network.
- Respond to inquiries in Ledningskollen in accordance with established procedures.

# 11. Change Work in Existing Installation

Change work in an existing installation refers to all measures carried out in an already operational fibre network that may affect the network's function, capacity, structure, robustness or security.

The term includes, among other things:

- capacity upgrades,
- restructuring of the network topology or redundancy,
- connection of new routes, nodes or customers to the existing network,
- technical modifications as a result of technology transitions or new requirements.

All change work shall be planned, risk assessed, implemented and documented in accordance with the same fundamental process and requirements as new construction, including application of the Risk and Vulnerability Analysis (RSA), documentation requirements and stage gates in accordance with this document.

## Requirements and Application Throughout the Process

- **Concept and Feasibility Phase:** The change shall be initiated as a planned change case. An initial Risk and Vulnerability Analysis (RSA) shall be carried out to assess impact on availability, integrity and confidentiality.
- **Preliminary Design:** Technical solutions shall be developed with focus on robustness and redundancy. The RSA shall be updated and supplemented with assessment of threats, dependencies and restoration capability.
- **Detailed Design:** The final technical design shall be reviewed from a security perspective. The change shall be documented in change and security protocols linked to the network asset register.
- **Procurement:** The tender documents shall include requirements regarding the contractor's security procedures, incident management, personnel authorisation and documentation in accordance with applicable legislation.
- **Implementation:** The work shall be carried out under controlled conditions with testing of restoration solutions, logging of impact and incident reporting in accordance with applicable legislation.
- **Documentation:** All change documentation shall be handled in accordance with applicable legislation, including updated RSA, verification results and approval by the responsible security officer.
- **Operations and Management:** After completion, the change shall be followed up and the RSA revised. Lessons learned shall be documented in the network owner's continuous improvement process in accordance with applicable legislation.

The purpose is to ensure that every change in the existing network is carried out in a controlled and traceable manner, maintaining the required level of security in accordance with applicable legislation.