THE COVERT PERIMETER SECURITY HANDBOOK

A PRACTICAL GUIDE TO UNDERGROUND AND INVISIBLE INTRUSION DETECTION SYSTEMS

For Security Consultants, Integrators, and Installers

Including a technical overview of seismic, fiber optic, and magnetic covert systems

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Chapter 1
The Rise of Invisible Security

Introduction: Why Perimeter Security Is Going Underground

In an era where security threats are becoming more calculated and perimeter protection is expected to be both effective and discreet, visible systems no longer meet the full spectrum of operational needs.

Traditional perimeter protection—such as fences, beam detectors, and surveillance cameras—can be bypassed, disabled, or simply avoided once identified. Their visibility, once considered a deterrent, now becomes a weakness.

This growing challenge has led to the rise of covert, underground intrusion detection systems—solutions that are invisible to intruders, protected from the environment, and capable of providing early, reliable detection without altering the appearance of the site.

Why the Market Is Shifting Toward Covert Solutions

From the Installer's Perspective

Installers and integrators working in the field face recurring issues with traditional visible systems:

- Environmental exposure leads to accelerated wear from dust, UV, moisture, or corrosion.
- False alarms are frequently triggered by small animals, birds, vegetation, and weather fluctuations.
- Customer objections to visible devices arise, especially in luxury homes, landscaped environments, or architecturally sensitive sites.
- Service and maintenance requirements increase over time due to equipment aging, mechanical failure, or vandalism.

Underground systems help address these issues:

- No exposed components = longer system lifespan
- Subsurface sensing = fewer nuisance alarms
- Clean site aesthetics = higher acceptance by architects and clients
- Minimal visible infrastructure = reduced vandalism and interference

For installers, covert systems present an opportunity to offer a higher-value, lower-maintenance solution that stands out from the competition.

Chapter 1
The Rise of Invisible Security

From the End User's Perspective

Security consultants, property owners, and site managers are also showing growing interest in covert systems—especially in contexts where both security and discretion are critical:

- Aesthetics: Landscaped gardens, high-end residences, and heritage sites demand protection without visual compromise.
- Discretion and deception: Invisible systems are difficult to detect, map, or evade—keeping intruders unaware of where or how detection occurs.
- Tamper resistance: Buried systems are far more difficult to access or disable.
- Silent detection: Alarms are triggered without alerting the intruder, giving responders valuable time to act.
- Premium image: Covert systems are increasingly seen as a hallmark of high-security or high-end environments.

What This Handbook Covers

This handbook is designed as a technical and practical guide for professionals involved in the planning, selection, and installation of underground intrusion detection systems.
It will:

- Explain the core principles of covert perimeter protection
- Compare the main technologies in the field (seismic, fiber optics, etc.)
- Offer real-world insights on deployment and integration
- Help installers and consultants make informed, objective decisions on the right solution for each use case
- Later chapters will explore these technologies in depth and highlight best practices for deployment, configuration, and long-term performance.

Chapter 2
Understanding Covert Perimeter Protection

What Defines a Covert Perimeter System?

A covert perimeter security system is one that operates without any visible components along the protected boundary.

The detection mechanism is installed entirely underground, making it undetectable to intruders, unaffected by environmental exposure, and aesthetically invisible.

These systems are designed to identify and alert on real physical intrusions, such as walking, running, crawling, digging, or driving over or near the protected zone—without relying on visible sensors, fences, or barriers.

The core principle is simple: security should not be seen to be effective.

Key Characteristics of Covert Systems

- Fully concealed installation below ground
- No visible hardware on the surface or fence line
- Tamper-resistant by design
- Minimal visual footprint – ideal for landscaped or sensitive sites
- Trigger-based alerting, often verified via cameras or monitoring systems

Where Covert Systems Are Most Applicable

Covert solutions are increasingly being adopted across various sectors, including:

- High-end residential properties where aesthetics are a key concern
- Critical infrastructure such as power plants, water facilities, and telecom hubs
- Government and military sites requiring discreet but reliable perimeter control
- Data centers and logistics facilities with limited fence line accessibility
- Heritage and public spaces where visual alterations are not permitted

Chapter 2
Understanding Covert Perimeter Protection

How Covert Systems Detect Intrusions

Most underground systems rely on vibration or movement sensing technologies. When a person or vehicle moves across or near the sensor line, it creates a detectable signature—be it ground vibrations, changes in cable tension, or acoustic signals—that is analyzed and used to generate an alarm.

Detection types include:

- Seismic – measures ground vibrations caused by footsteps, digging, or vehicles
- Fiber optic – senses pressure, movement, or vibration along a cable
- Magnetic – detects disturbances in the earth's magnetic field caused by metal objects

Each of these technologies has distinct capabilities, advantages, and limitations, which will be compared in the next chapter.

Covert Systems as a First Line of Detection

Covert systems are typically deployed as the primary detection layer, providing early alerting while the intruder is still outside or near the perimeter.
In many installations, they are integrated with secondary systems such as:

- CCTV or PTZ cameras for alarm verification
- Alarm panels or intrusion platforms
- VMS or PSIM systems for centralized monitoring

The goal is to create a multi-layered, high-reliability perimeter defense without relying solely on visible deterrents.

Chapter 3
Core Technologies Behind Underground Detection Systems

Underground intrusion detection systems can be classified based on the sensing technology they use. Each technology operates on a different physical principle, resulting in unique detection characteristics, installation methods, and integration requirements.
Understanding the key technologies is essential for making informed decisions during system design, product selection, or tender specification.

1. Seismic Detection Systems

Operating Principle:

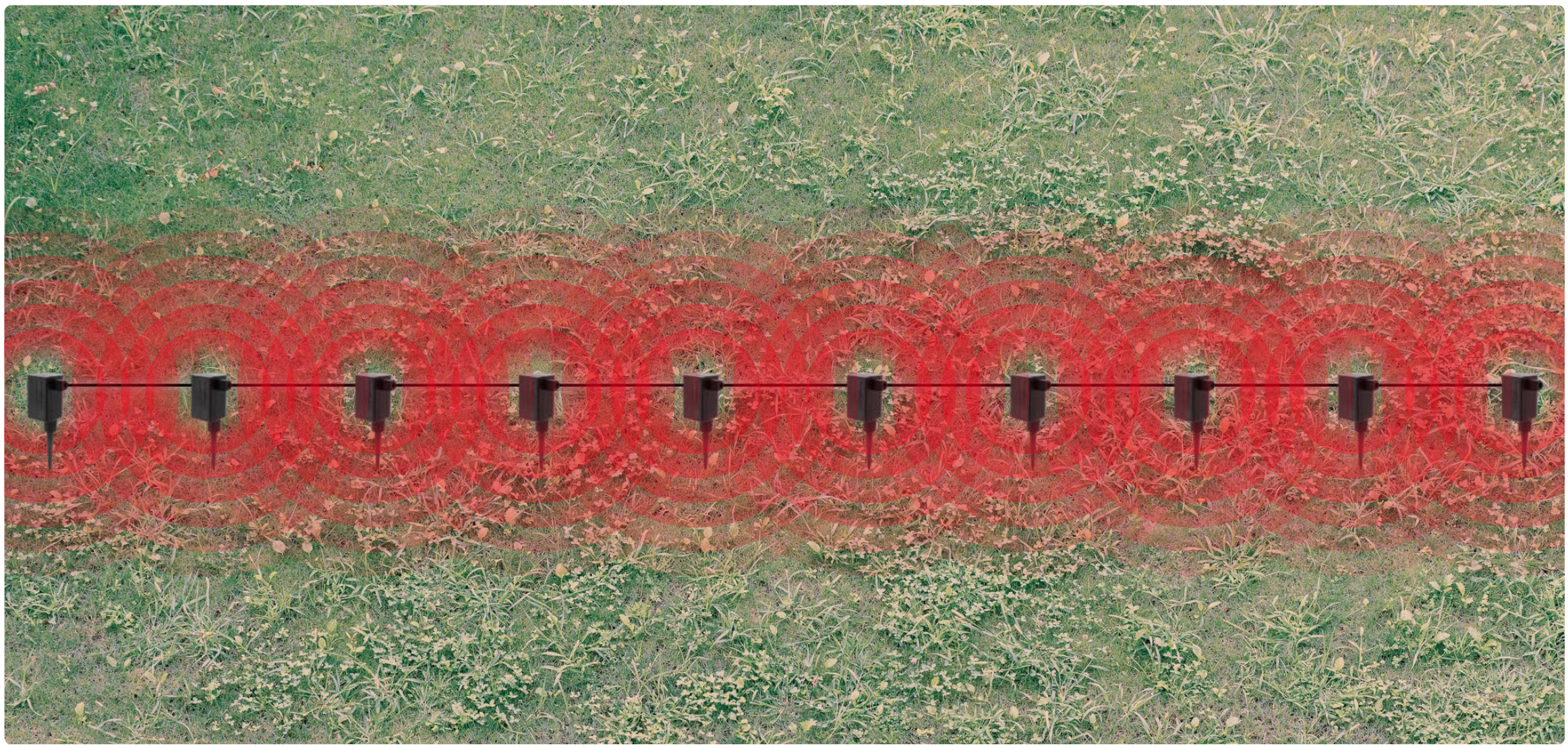
Detect and classify vibrations caused by footsteps, digging, crawling, or vehicles. Sensors are buried along the perimeter and measure seismic waves traveling through the ground.

Key Characteristics:

- Sensitive to human footsteps, tunneling, and light vehicle movement
- Directional detection along a linear axis
- Typically installed 20–40 cm below surface level
- Immune to environmental visibility factors (fog, dust, light)
- Low false alarm rates when paired with proper signal processing
- Integration with VMS/CCTV for alarm verification is common

Typical Applications:

- Residential perimeters
- Utility stations and remote infrastructure
- Border and military zones



Chapter 3
Core Technologies Behind Underground Detection Systems

2. Fiber Optic Sensing Systems

Operating Principle:

Use light signals transmitted through fiber optic cables to detect pressure, vibration, or movement.

Intrusions cause disturbances in the light pattern, which are analyzed by a central processor.

Key Characteristics:

- Highly sensitive to surface vibrations and movement
- Capable of detecting footsteps, vehicles, digging, and cutting
- Can be deployed along fences or buried underground
- Longer detection ranges (up to several km per controller)
- Sensitive to temperature shifts and requires precise calibration

Typical Applications:

- Airport perimeters
- Large-scale critical infrastructure
- Border and desert environments

3. Magnetic Detection Systems

Operating Principle:

Measure disturbances in the earth's magnetic field caused by the presence or movement of ferrous materials (e.g., vehicles, tools, weapons).

Key Characteristics:

- Effective at detecting vehicles and metal-based objects
- Less effective for human-only detection unless carrying metal
- Limited coverage area per sensor unit
- Typically used in choke points, gates, or driveways

Typical Applications:

- Vehicle entrances
- Military access roads
- Industrial gate monitoring

Chapter 3
Core Technologies Behind Underground Detection Systems

Comparison Considerations

Each technology offers different advantages in terms of:

- Detection reliability
- False alarm immunity
- Installation complexity
- Maintenance needs
- Integration capabilities

In the next chapter, we will present a side-by-side comparison of these technologies and introduce key criteria to help evaluate which system is best suited for specific security projects and environments.

Chapter 4
Comparing Covert Detection Technologies

With multiple underground intrusion detection technologies available, selecting the right solution depends on several operational, environmental, and technical factors.
This chapter presents a technical comparison of the three primary categories: seismic, fiber optic, and magnetic systems.

The aim is to help integrators, consultants, and decision-makers objectively evaluate which technology aligns best with their project requirements.

1. Detection Capability

Technology	Detects Footsteps	Detects Digging	Detects Vehicles	Detects Crawling
Seismic	✅ High Accuracy	✅ Very Effective	✅ Effective	✅ Sensitive
Fiber Optic	✅ Accurate	✅ Accurate	✅ Accurate	✅ Accurate
Magnetic	❌ Limited	❌ No	✅ Very Effective	❌ No

2. False Alarm Immunity

Technology	Resistance to Small Animals/Birds	Weather Tolerance	Environmental Stability
Seismic	✅ High	✅ High	✅ Stable
Fiber Optic	Medium (requires tuning)	Sensitive	May require calibration
Magnetic	✅ High (metal only)	✅ High	✅ Stable

3. Installation Factors

Technology	Buried Installation Depth	Cable Length per Controller	Complexity	Maintenance
Seismic	20–40 cm	Medium (hundreds of meters)	Moderate	Low
Fiber Optic	Variable	Long (several kilometers)	High	Medium
Magnetic	Shallow or surface	Short (individual sensors)	Low	Low

4. Integration and Scalability

Technology	VMS/Alarm Panel Integration	Scalable for Large Sites	Alarm Verification Support
Seismic	✅ Native or via API	✅ Modular	✅ With PTZ or fixed cameras
Fiber Optic	✅ Requires dedicated unit	✅ High scalability	✅ Common use case
Magnetic	Limited integration	❌ Not scalable	Basic

Chapter 4
Comparing Covert Detection Technologies

Summary & Considerations

Seismic systems offer strong performance for detecting human intrusions with low false alarms, moderate installation effort, and excellent environmental resilience.
They are well-suited for residential, critical infrastructure, and military applications.
Fiber optic systems provide extended range and good accuracy but may require more complex calibration and installation, especially in variable environmental conditions.
Magnetic systems are simple and effective for vehicle detection at specific points but are not viable for full perimeter coverage or human detection.

In the next chapter, we will take a closer look at seismic detection systems, including how they work, typical deployment methods, and the features that make them a strong candidate for modern covert perimeter protection.

Chapter 5
Seismic Detection Systems in Detail

Seismic detection is one of the most widely adopted technologies in covert perimeter security due to its proven performance, low visual impact, and high detection reliability.
This chapter provides a deeper understanding of how seismic systems work, their deployment considerations, and their advantages in real-world applications.

1. Operating Principle

Seismic sensors detect ground vibrations caused by human or vehicular movement. These vibrations travel through the soil and are picked up by buried geophones or vibration-sensing elements. The system analyzes these signals to determine whether the vibration pattern corresponds to an intrusion event (e.g., walking, running, crawling, digging, or driving).
Advanced seismic systems use signal processing algorithms to filter out noise and classify the source of vibration.
This results in accurate detection with minimal false alarms.

2. System Architecture

A typical seismic system consists of:

- Buried seismic sensors or cables: Installed at regular intervals along the protected perimeter
- Processing unit/controller: Interprets the seismic signals, classifies events, and generates alarms
- Communication interface: Connects the system to alarm panels, VMS, or command-and-control platforms
- Optional integration with video or access control systems for alarm verification

3. Installation Guidelines

- Burial depth: Typically between 20–40 cm below ground level
- Substrate: Works in various soil types; consistent soil contact is essential
- Terrain: Effective on flat or sloped ground, under grass, gravel, or paved surfaces
- Layout: Can follow perimeter lines, fence bases, or sensitive approach paths

Installation should ensure:

- Continuous cable or sensor coverage
- Avoidance of nearby mechanical noise sources (e.g., generators, pumps)
- Proper calibration post-installation for site-specific tuning

Chapter 5
Seismic Detection Systems in Detail

4. Detection Capabilities

Seismic systems can detect:

- Walking or running humans
- Crawling or low-profile movement
- Digging or tunneling activity
- Vehicles passing over or near the sensor line

Detection sensitivity and classification can be adjusted to balance detection range and false alarm resistance.

5. Advantages of Seismic Systems

- Invisible protection with no visual components above ground
- High detection accuracy for human movement
- Immunity to false alarms from light, fog, wind, small animals, and weather
- Minimal maintenance post-installation
- Versatile deployment across residential, commercial, and high-security sites

7. Limitations and Considerations

- Not effective for extremely soft or loose soil without proper installation
- Performance can vary based on terrain, soil type, and environmental noise
- Requires calibration to filter out site-specific background vibrations

Conclusion

Seismic systems offer a balanced combination of reliability, performance, and concealment, making them one of the most practical covert detection options available today.

In the next chapter, we'll examine how one specific seismic solution builds upon these strengths to deliver best-in-class covert perimeter protection.

Chapter 6
InvisiFence Plus – A Closer Look

Following a thorough overview of seismic detection systems, this chapter introduces InvisiFence Plus, SensoGuard's flagship underground solution. It builds on proven seismic detection principles and enhances them with advanced signal processing, modular architecture, and integration capabilities that make it stand out in the covert perimeter protection market.

InvisiFence Plus system components

1. System Overview

InvisiFence Plus is a seismic-based intrusion detection system designed for fully underground deployment.
It detects human movement, crawling, digging, or vehicle passage across or near the buried sensor line.
Each detection event is analyzed by proprietary algorithms to determine the type, location, and confidence level of the intrusion.
This allows for accurate alerts, low false alarm rates, and seamless integration with verification systems such as PTZ cameras or VMS platforms.

2. Architecture and Components

The system consists of:

- Underground seismic sensor cable, installed in segments along the perimeter (standard burial depth: 30–40 cm)
- Distributed Sensor Processing Units (embedded on each sensor)
- Communication interface, supporting IP, RS485, or dry contacts
- Optional integration with CCS-OnSite or CCS-Web, SensoGuard's central command software

A flexible design allows zone-based detection, supporting both perimeter-wide and sector-specific alerts.

Chapter 6
InvisiFence Plus – A Closer Look

3. Key Advantages

Feature	InvisiFence Plus Benefit
True underground install	No surface components, fully concealed detection
Human classification	Advanced pattern analysis to detect walking, running, crawling
Low false alarm rate	Immune to birds, small animals, wind, and lighting conditions
Modular architecture	Scalable from small residential sites to long perimeters
Flexible integration	Open protocols, supports camera triggering and alarm software
Minimal maintenance	Long operational lifespan, no moving parts or optics
Remote calibration	Fast tuning and diagnostics via built-in tools

4. Integration Capabilities

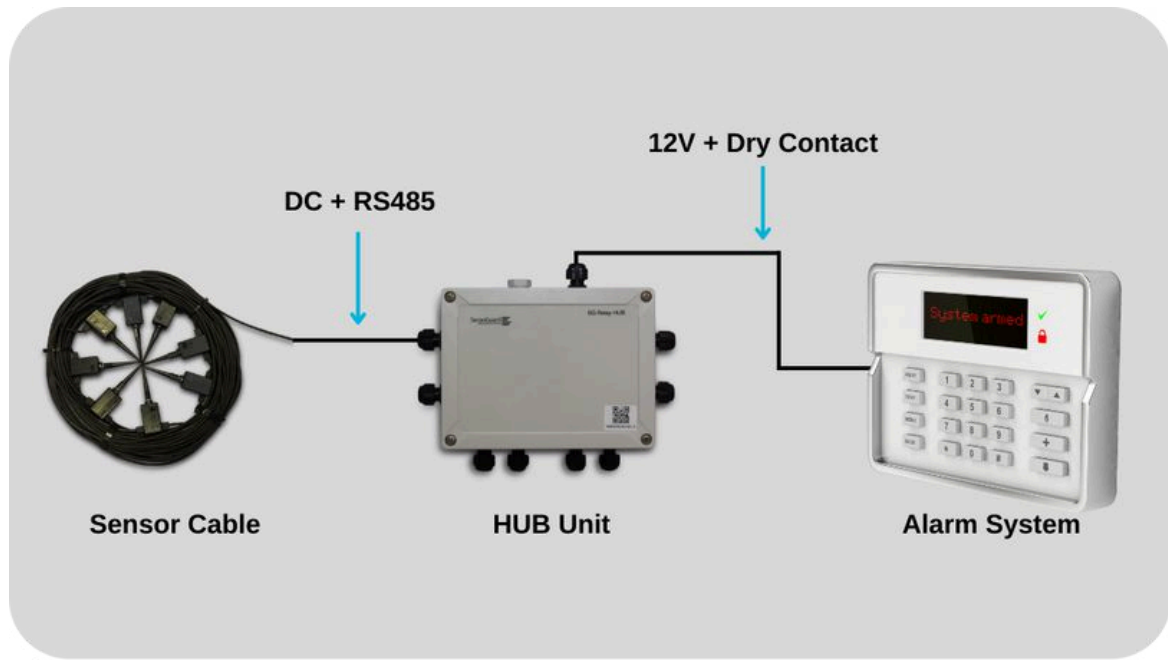
InvisiFence Plus is designed for seamless integration into broader security ecosystems.

Supported platforms include:

- Video Management Systems (VMS): Digifort, Milestone, Axis Camera Station, IDIS ISS, and others
- Alarm & SCADA platforms: via dry contact or IP-based alerts

Integration is made easy via open API, allowing security consultants and integrators to incorporate it into multi-layered security strategies.

Command & Control Connection



Alarm System Connection

5. Deployment Use Cases

InvisiFence Plus has been successfully deployed in:

- High-end private residences seeking invisible protection
- Utilities and infrastructure sites with no tolerance for false alarms
- Border and sensitive government facilities
- Military bases and forward outposts requiring silent perimeter breach detection

Each deployment can be tailored with custom zone lengths, sensor density, and integration requirements—ensuring the system matches both the terrain and the threat model.

Chapter 6
InvisiFence Plus – A Closer Look

6. Installer and Partner Benefits

For system integrators and installers, InvisiFence Plus offers:

- Straightforward installation with trench-laying or sub-surface burial
- Minimal call-backs due to its stability and durability
- Support for both wired and wireless versions
- Certification and training programs to ensure project success
- Strong differentiation in tenders and high-end security proposals

Conclusion

InvisiFence Plus combines the core strengths of seismic detection with modern design, scalable architecture, and real-world reliability. It stands out as a top-tier choice for projects demanding invisible, intelligent, and trusted perimeter protection.

In the next chapter, we'll explore deployment considerations and planning tips, helping security professionals ensure the most effective use of covert systems like InvisiFence Plus in various site conditions.

Chapter 7
Deployment Scenarios and Best Practices

A successful covert perimeter detection system depends not only on the technology itself, but also on site-specific deployment planning, correct installation methods, and integration with response workflows.
This chapter outlines common deployment scenarios, best practices for underground installation, and key considerations to help ensure optimal detection performance and long-term reliability.

1. Common Deployment Scenarios

✅ High-End Residential Properties

- Objective: Provide effective intrusion detection without disturbing aesthetics.
- Approach: Install seismic cable along the outer perimeter, under grass, gravel, or paved walkways.
- Integration: PTZ/Fixed cameras for verification; alerts sent to home automation or central monitoring.

✅ Utilities & Critical Infrastructure

- Objective: Detect human presence in restricted areas and prevent tampering or sabotage.
- Approach: Deploy in zones around transformers, tanks, or perimeter fences.
- Integration: Connect to SCADA or security systems, with central monitoring and remote diagnostics.

✅ Military and Government Sites

- Objective:Early intrusion detection without revealing system location.
- Approach: Create wide-area sensor fields around perimeter lines or sensitive compounds.
- Integration: Tie into C2 platforms, video systems, or tactical response networks.

✅ Data Centers and Logistics Hubs

- Objective: Detect unauthorized movement near perimeters.
- Approach: Install seismic sensors under perimeter pavement or landscaping features.
- Integration: Trigger alarm escalation with camera zones and access control lockouts.

Chapter 7
Deployment Scenarios and Best Practices

2. Best Practices for Installation

Burial Depth: Typically 30–40 cm. Maintain consistent depth along the entire sensor line.
Trenching Guidelines: Use straight, clean trenches where possible. Avoid sharp bends.
Soil Contact: Backfill with compacted soil to ensure solid vibration transfer. Avoid loose sand or rubble.
Avoid Vibration Noise Sources: Do not install near machinery (generators, pumps) or high-traffic areas unless these are excluded from the detection zone during calibration.
Sensor Zoning: Divide the perimeter into logical zones (e.g., front gate, backyard, east fence) for better alarm resolution and faster response.

InvisiFence Plus sensor cable buried underground

3. Integration Tips

Alarm Verification: Integrate with PTZ/Fixed cameras to automatically focus on the triggered zone. Use visual confirmation to avoid false responses.
Smart Escalation: Use software logic (e.g., dual detection from seismic + camera) to reduce nuisance alarms and trigger higher-priority alerts only when both sensors agree.
Remote Access: Where possible, choose systems that support remote tuning, diagnostics, and firmware updates—reducing field visits and improving service levels.

4. Environmental Considerations

Vegetation: Sensors can be buried under grass, shrubs, or decorative gravel. No trimming or line-of-sight clearing required, unlike visible sensors.
Weather: Underground systems are unaffected by rain, snow, fog, or dust—making them ideal for harsh or changing climates.
Terrain: Slopes, corners, and elevation changes are manageable, but require consistent installation depth and adjusted calibration if detection sensitivity varies.

Chapter 8
System Integration and Remote Management

A covert intrusion detection system must do more than detect movement — it must also communicate clearly, integrate seamlessly, and support reliable remote management.
Integration and connectivity are key to ensuring rapid response, minimal false alarms, and effective system maintenance across time.

This chapter covers how underground systems like seismic sensors fit into modern security infrastructures, and the tools available for remote diagnostics, calibration, and monitoring.

1. Integration with Security Systems

Covert detection systems are rarely standalone.
They are often used in conjunction with:

Video Management Systems (VMS)

- Enables visual verification of intrusion events using PTZ or fixed cameras.

Intrusion Alarm Panels

- Connects via dry contact or IP relays to generate alarms locally or via central stations.

SCADA / PSIM Platforms

- Supports integration with broader infrastructure or critical facility monitoring systems.

Access Control Systems

- Can trigger automated lockdowns or denial of access during verified perimeter breaches.

2. Communication Interfaces

A robust underground system must offer flexible communication options to match various deployment types:

Interface Type	Use Case
Dry Contact (Relay Output)	Direct connection to conventional alarm panels
RS485 / Modbus	Integration with industrial or legacy systems
TCP/IP (LAN/WAN)	For advanced platforms, remote access, and video system integration
Encrypted IP Channels	Required for government, military, or critical infrastructure projects

This multi-interface approach allows the system to function in isolated stand-alone configurations or as part of complex networked environments.

3. Alarm Verification Workflows

To reduce false alarms and improve situational awareness, seismic systems are frequently paired with camera systems:

PTZ Camera Integration

- The system can trigger a PTZ camera to focus on the zone where an intrusion was detected.

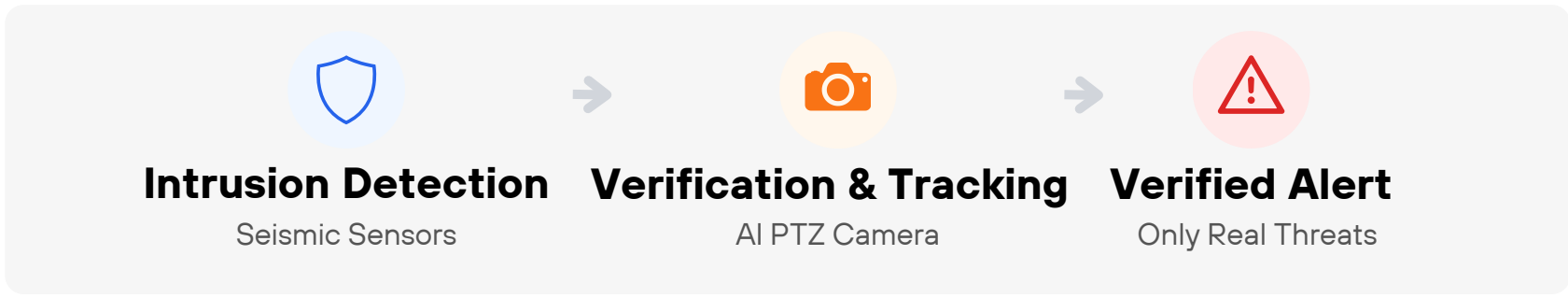
Video Pop-Up & Recording

- Integration with VMS enables automatic video pop-ups or tagged recordings upon alarm events.

Zone-Based Response

- Each seismic zone can correspond to a camera field-of-view for fast human validation.

This allows control room operators to quickly assess the cause of the alarm and initiate the correct response procedure.



4. Centralized Management Software

Advanced seismic systems, such as those offered by SensoGuard, include access to command software platforms like CCS-OnSite or CCS-Web.

These platforms offer:

- Live status monitoring for all sensor zones
- Remote calibration and tuning
- Alarm log review and classification
- System health checks and real-time diagnostics
- Multi-site management from a centralized interface

Whether installed at a private residence or across multiple infrastructure facilities, these tools allow security professionals to manage systems efficiently and proactively.

5. Remote Diagnostics and Maintenance

Remote tools greatly reduce the need for on-site technician visits by allowing:

- Noise level monitoring and baseline drift checks
- Firmware updates or sensitivity adjustments
- Event log downloads for post-incident analysis
- Troubleshooting support in real-time

This is particularly valuable for integrators managing large deployments or sites with limited physical access.

Chapter 8
System Integration and Remote Management

6. Cybersecurity Considerations

As underground systems become more connected, secure communication becomes critical:

- Encrypted data transmission (e.g., TLS/SSL) should be used for IP-based integrations
- Systems should be protected against unauthorized access via login credentials and access control layers
- Remote access should be protected via VPN or similar technologies

SensoGuard's systems are designed with cybersecure architecture to support compliance with government and infrastructure-grade security requirements.

Conclusion

Integration and remote management are not optional — they are core requirements for scalable, effective perimeter protection.
Seismic systems like InvisiFence Plus are built with these capabilities in mind, ensuring they fit seamlessly into modern security environments and support long-term operational success.

Next, we'll address the most common technical and operational questions professionals ask when considering underground detection systems.

Chapter 9
Frequently Asked Questions

This chapter addresses some of the most common technical, operational, and deployment-related questions professionals ask when considering underground seismic detection systems.

1. Can the system detect crawling or slow movement?

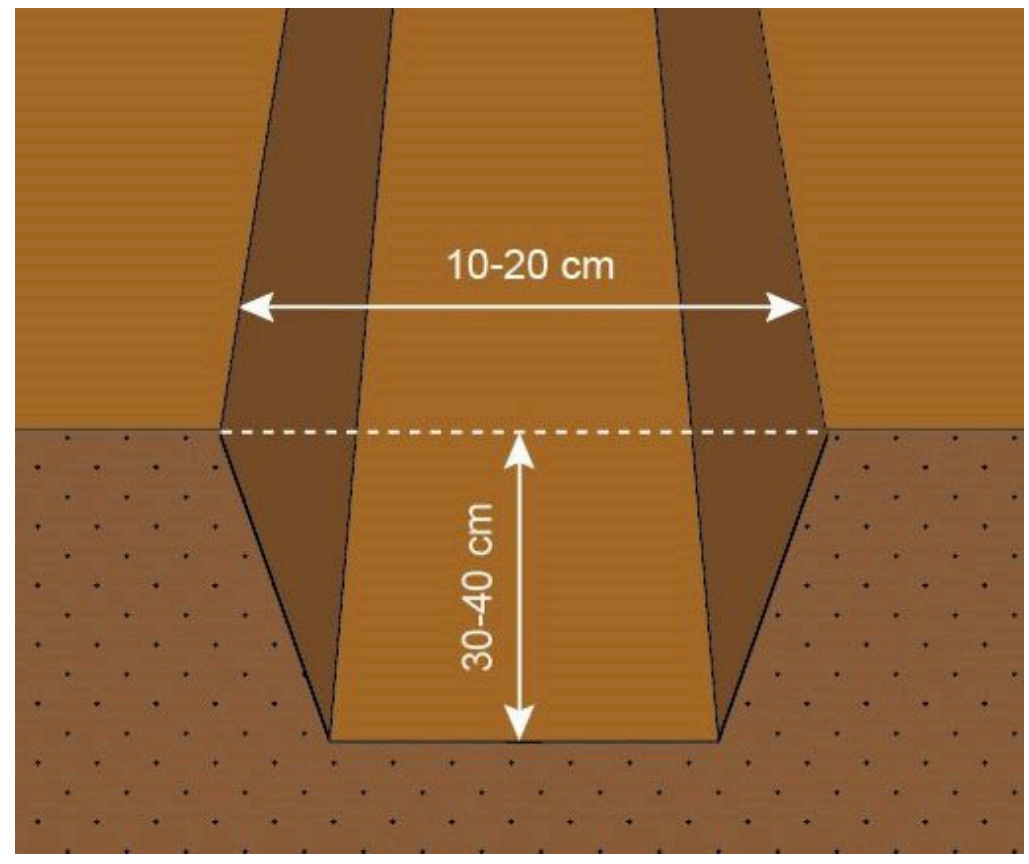
Yes. Seismic systems are highly sensitive to ground vibrations and can reliably detect low-profile movements such as crawling or rolling, depending on the soil type and calibration settings. Detection range may vary slightly for different movement types, but proper tuning ensures consistent performance.

2. What is the effective detection range of the sensor line?

Typical detection ranges for walking or running humans are 3–5m on either side of the buried sensor line. The range may vary slightly based on soil type, movement type, burial depth, and background noise. Vehicles and digging activity generally produce stronger seismic signatures and may be detected from even greater distances.

3. How deep should the sensors be buried?

The standard recommended burial depth is 30–50 cm, with 50 cm preferred for long-term stability. Deeper burial is also acceptable and does not negatively impact performance, as long as soil contact is maintained.
We recommend digging a trench of at least 30 cm deep and placing the sensors at 50 cm depth. This helps prevent the sensors or cable from becoming exposed over time due to soil erosion, rainfall, wind, or surface activity. Proper compaction of the backfill is important to ensure vibration transfer and physical protection.



4. Can the system operate in sandy, rocky, or frozen soil?

Yes, seismic systems can operate in a wide range of soil types. The most critical factor is soil compaction — seismic waves travel poorly through air gaps, so the more compact and uniform the soil, the better the signal transmission.

- Sandy soil: Usable, but must be well compacted during backfill to eliminate air pockets.
- Rocky soil: Can work, but large voids between rocks may degrade signal quality; should be evaluated during the site survey.
- Wet ground: Not a problem — moisture typically improves seismic wave transmission.
- Frozen ground: Can slightly reduce sensitivity, but the system remains operational with proper calibration.

Good installation practices, including consistent burial depth and compacted backfill, are key to maintaining optimal performance in all soil types.

5. What about interference from nearby roads or industrial activity?

Seismic systems detect ground vibrations, so it's important to consider environmental noise sources during planning.

While small access roads and light vehicle activity usually do not cause issues, main roads, highways, and railways can generate continuous low-frequency vibrations that may affect detection accuracy.

We recommend maintaining the following minimum distances:

- 6 meters from footpaths or pedestrian areas
- 40 meters from main roads or highways
- 150 meters from railway tracks

If these distances cannot be achieved, the system can be calibrated to filter out vehicle vibrations or configured with reduced sensitivity in affected zones.

Still, keeping adequate distance from high-traffic areas is the most effective approach for ensuring stable and reliable operation.

6. How many zones can be defined?

Zone configuration is flexible and depends on the system architecture and integration method:

- Zones can be defined per individual sensor, or by grouping multiple sensors into a single zone, depending on the desired level of alarm resolution.
- When using the IP alarm interface (via CCS-OnSite or CCS-Web), there is no limitation on the number of zones — zones can be virtually configured as needed for integration with VMS, PSIM, or command platforms.
- When using a Hub with dry contact outputs, each Hub supports 18 physical alarm zones. If more zones are required, additional Hub units can be added.
- Up to 38 sensors can be connected to a single Hub unit, and zones can be flexibly assigned to any combination of those sensors.

This zoning flexibility allows integrators to tailor detection logic, camera linking, and alarm management to the specific layout and risk profile of each site.

Chapter 9
Frequently Asked Questions

8. How is the system calibrated?

Calibration is performed using the SensoGuard PC Suite, a dedicated software tool that allows precise tuning of the detection system after installation.

The calibration process includes:

- Live monitoring of background noise levels
- Performing a walk test or simulating real threats (e.g., crawling, digging, or vehicle movement)
- Adjusting sensitivity levels and logic parameters (e.g., detection thresholds, signal filters) to ensure accurate detection without false alarms

The software provides visual and numerical feedback, enabling installers to fine-tune each zone based on the specific soil conditions, site layout, and threat types.

To support installers and integrators, SensoGuard provides online video tutorials on its website and YouTube channel explaining step-by-step how to calibrate and test the system effectively.

9. Is maintenance required?

Minimal. Once installed and calibrated, the system operates with very low maintenance. Occasional checks are recommended to:

- Review alarm logs
- Verify communication status
- Recalibrate if major site changes occur (e.g., new construction or landscaping)

10. What happens if the cable is damaged or cut?

The system will generate a tamper or fault alarm if the sensor line is physically interrupted. Some systems also support redundancy modes (e.g., loop configuration) to maintain detection capabilities even if one section is compromised.

11. Can the system detect tunneling or digging?

Yes. Digging and underground movement produce distinct seismic patterns that the system can detect and classify. Detection range depends on soil type and distance to the activity, but digging is one of the strongest seismic signatures.

Chapter 9
Frequently Asked Questions

12. Is wireless communication supported?

Yes. Wireless communication is supported in multiple configurations:

Wireless sensors (UGS – Unattended Ground Sensors):

- SensoGuard offers wireless seismic sensors that operate independently and transmit alarms via long-range RF. These are ideal for temporary deployments, remote areas, or locations without infrastructure.

Wireless communication from Hub to control room:

- Even when using the wired InvisiFence system, it is possible to transmit alarm data wirelessly from the Hub to the control room using a cellular modem, radio link, or wireless IP bridge — useful in cases where there is no cabling infrastructure between the Hub location and the monitoring station.

These options provide flexibility for projects with limited wiring access, off-grid locations, or rapid deployment requirements.

13. Is the system suitable for retrofitting existing sites?

Yes. Seismic systems can be added to existing sites with minimal disruption. Installation involves trenching and burial but no need for line-of-sight, allowing integration even in fully developed properties or landscaped areas.

Conclusion

Seismic detection systems are flexible, robust, and capable of addressing a wide range of perimeter protection challenges.

By understanding how the system operates and what conditions influence performance, integrators and consultants can confidently specify and deploy covert solutions for virtually any site.

In the final chapter, we'll explain how to get started with planning, evaluation, and professional deployment of these systems.

Chapter 10
Getting Started

Whether you're a security consultant planning a sensitive site, or an installer expanding your portfolio with covert solutions, implementing an underground seismic detection system involves a structured approach from site evaluation to system deployment.
This chapter outlines the key steps to help you get started effectively and confidently.

1. Site Evaluation and Feasibility Check

Before any installation, it's important to understand the site environment and security needs:

- Define the perimeter zones that require coverage
- Identify potential vibration sources nearby (e.g., roads, generators, industrial equipment)
- Assess soil type and compaction for signal transmission
- Review any aesthetic, structural, or landscape constraints

2. Selecting the Right Configuration

Based on the site conditions and project requirements, choose between:

Wired underground system (InvisiFence Plus)

- Suitable for permanent installations with available trenching and power infrastructure

Wireless sensor solution (UGS)

- Ideal for temporary, mobile, or remote applications

Decide on:

- Wired vs. wireless communication from field to control room
- Number of zones required (based on control logic or integration needs)
- Integration method (IP-based vs. relay-based, VMS platforms, etc.)

3. Training and Certification

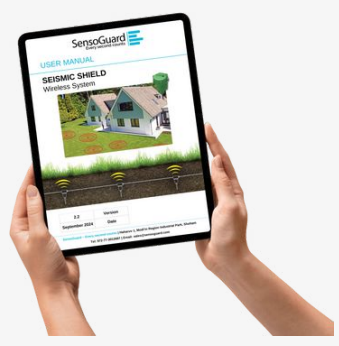
To ensure proper installation and performance, SensoGuard offers:

- Certified Installer Training (available online or on-site)
- Step-by-step installation guides and manuals
- PC Suite calibration tutorials via the SensoGuard website and YouTube channel

Training covers trenching, burial, wiring, calibration, and system testing to ensure installers are fully equipped for deployment.

Training

- Installation certification
- Technical documentation
- Online training modules



Technical Support

- Remote troubleshooting
- Installation assistance
- Regular updates

Marketing Support

- Marketing materials
- Sales training
- Demo equipment

4. Deployment and Commissioning

- Plan trench layout and sensor placement according to site layout
- Maintain recommended 50 cm burial depth
- Group sensors into zones as required
- Use the PC Suite to calibrate each zone, simulate threats, and finalize sensitivity settings
- Integrate with VMS, alarm panels, or control software
- Perform a full system test before handover

5. Support and Documentation

SensoGuard provides:

- Technical documentation, wiring diagrams, and spec sheets
- Design and integration support for consultants and project engineers
- Remote diagnostic assistance post-installation
- Software updates and remote configuration tools via CCS-OnSite / CCS-Web

Conclusion

Underground seismic systems provide reliable, discreet, and low-maintenance perimeter protection. With the right planning and calibration, they can enhance security across residential, commercial, and critical sites.

This handbook gives you the foundation to move forward with professional covert detection.