

Invasive species in land remediation

How they drive up costs, carbon footprint and limit sustainable soil handling

NORDROCS 2026 | Sustainable land management

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What is the problem?

Invasive plants are an increasing issue in remediation and construction projects.

Japanese knotweed

Regrows from very small rhizome fragments
Requires careful soil handling



Canadian goldenrod

Spreads rapidly on disturbed ground
Seed and root spread



Himalayan balsam

Ripe pods burst at a touch in autumn – seeds fly several metres
Fast seed dispersal



The challenge is not only the plants. Their presence changes excavation, transport, reuse and soil management strategies.

Contaminated soil – or not?

“Is this soil contaminated?”

1 Clean soil

No chemical contamination
Invasive species present
Handling driven by
spreading risk only

2 Contaminated soil

Chemical contamination
Invasive species present
Two risk types must be
managed together

3 Soil suitable for reuse

Could have been reused
on site
Invasive species change
the reuse strategy

Should soil with invasive plants be handled as contaminated soil?

What do the rules actually require?

Legal requirements

Prevent the spread of regulated invasive species.
Restrictions may apply to movement, use and release.

Regulatory guidance

Identify the risk early and manage the soil so that spread is prevented.
Methods depend on species, site and intended soil use.

Project decisions & receiving facility requirements

Projects and receivers translate this into practical handling rules.
These requirements may be more conservative than the legislation itself.

These three levels are not necessarily the same thing.

Where does the legal requirement end and risk-averse project practice begin?

Why does timing matter?



Early identification – during site investigation

Species identified before design
Actual spreading risk can be assessed
Several management options remain available
Local treatment or reuse may still be possible

Possible management approaches – examples

In situ treatment · Herbicide / chemical vegetation control · Physical control · Covering or containment · Excavation only where needed

Suitability depends on species, site and intended land use.

Early identification can sometimes avoid excavation altogether.

Late discovery – during construction

Design and procurement may already be fixed
Time pressure is higher
Fewer treatment options remain
Bulk excavation and off-site transport become more likely
Reuse options may be lost
Cost and schedule pressure increase

The later invasive species are identified, the fewer options remain.

Falköping depot – a large project already in motion

Project facts

Area: approx. 5 ha

Major railway construction project

Contaminated land

Japanese knotweed, giant knotweed, Canadian goldenrod, lupin, Himalayan balsam

Approx. 73,000 tonnes of soil transported off site

Approx. 1500 tonnes with both contamination and invasive species

Approx. 10,500 tonnes with invasive species, clean enough to be relocated within the site



Site overview – mapped occurrences of invasive species

Falköping: what drove the decisions?

1

Surveying is not enough

The information must enter the design and soil management strategy.

2

Two risks must be managed together

Chemical contamination + invasive species can severely limit reuse and receiving options.

3

Different species need different strategies

Excavation, burial, covering, mechanical control and long-term management were all used.

Was all off-site handling actually necessary?

Kinnarp – the project setup

Road construction project.

The purpose here is to establish the conditions on site before the construction solution was fixed.

Project setup

Approx. 5,000 m³ soil needed to be moved

Limited space available on the property

Some contamination above KM, but no need for disposal based on contamination alone

Canadian goldenrod and lupin identified

Survey and soil strategy developed before the construction solution was fixed

The problem was identified while there was still room to change the solution.

Kinnarp – what did early planning make possible?

Early identification turned into three concrete steps.
Assess the conditions, design a local solution and keep the option of reuse alive.

1. Assess the actual conditions

What species are present?
What is the chemical quality of the soil?
What spreading mechanisms matter?

2. Design a local solution

Approx. 5,000 m³ managed locally
Controlled placement
Covering adapted to the species
Authority dialogue before implementation

3. Keep the option alive

Avoid unnecessary off-site transport
Keep material as a resource
Reduce need for replacement material
Solution implemented as planned

Early identification created options. It did not automatically decide the solution.

Same problem – different climate impact

Climate impact per treated soil volume, kg CO₂e/m³

Falköping – off-site handling



39.9 kg CO₂e/m³

Kinnarp – local management



15.3 kg CO₂e/m³

Falköping – local management



5.6 kg CO₂e/m³

The management route has a major influence on the carbon footprint.

Calculated with SGF Carbon Footprint. System boundary: physical soil handling, transport and treatment/disposal only. Replacement material and project overheads are excluded.

What did local soil management save in Falköping?

Comparison within the same project – actual solution vs. all affected soil transported off site

Scenario A – all affected soil transported off site

≈ 571 t CO₂e

Hypothetical: all affected soil taken off site

Scenario B – actual project solution

≈ 139 t CO₂e

2,000 m³ off site + 10,500 m³ managed locally

≈ 433 t CO₂e avoided · ≈ 76% lower emissions

10,500 m³ managed locally instead of transported off site

Replacement material is not included. If replacement soil had been required after off-site disposal, the climate difference would likely have been larger.

Not every invasive species needs to be removed

First ask: what is actually required?

Decision questions

- Can the species remain on site?
- Is long-term control enough, or is eradication required?
- Will future construction disturb the affected soil?
- Can the risk be managed without excavation?
- If excavation is needed, can the soil be treated, covered, reused or contained locally?

Management options

- In situ treatment
- Repeated cutting / mechanical control
- Herbicide / vegetation control
- Covering or containment
- Selective excavation – analyse the soil
- Controlled local reuse
- Off-site transport only where necessary

The appropriate method depends on the species, the site, legal requirements and future land use.

The presence of an invasive species does not automatically mean that the soil has to be removed.

Take-home messages

1

Identify early – and use the information

An early survey only creates value if the results enter the design and soil strategy.

2

Manage the actual risk

Chemical contamination and invasive species are different risks and may require different solutions.

3

Keep options open

Local management can reduce transport, cost and carbon emissions when spreading risk can be controlled.

The question should not only be “How do we get rid of this soil?” but “How do we manage the risk?”

The background of the slide is a close-up photograph of numerous purple flower spikes, likely from a Buddleja plant, with green leaves interspersed. The image has a slightly desaturated, teal-like tint.

Thank you

Time for questions

Thank you for the opportunity to present at NORDROCS 2026

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