

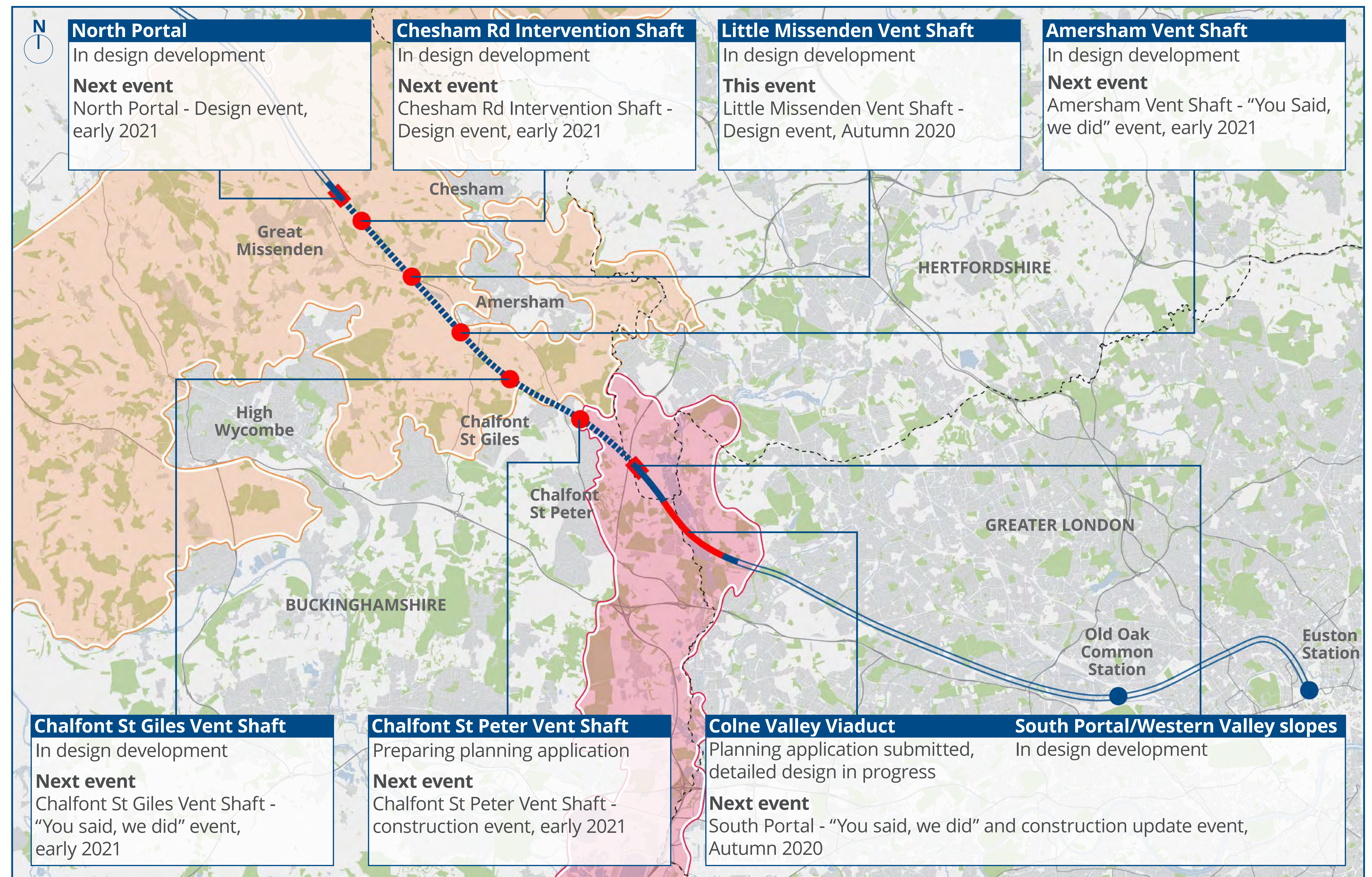
# The HS2 route in the Chilterns and the Colne Valley

High Speed Two (HS2) is the new high speed railway for Britain.

## What we are doing

Align are working on behalf of HS2 Ltd to build 22 kilometres of the high speed rail line, running between the Colne Valley and the Chilterns. It includes the 3.4 kilometre long Colne Valley Viaduct and the Chiltern tunnel with four ventilation (vent) shafts to regulate airflow, one intervention shaft and the shaft headhouses which house electrical equipment.

Our main works programme is now underway and we are holding regular information events to share details on the progress of the designs, seek views and respond to feedback. Due to COVID-19 we have postponed all public face-to-face engagement events and meetings, but we will continue to find new ways to involve the community.





# Introduction

Welcome to our design event for the Little Missenden vent shaft.

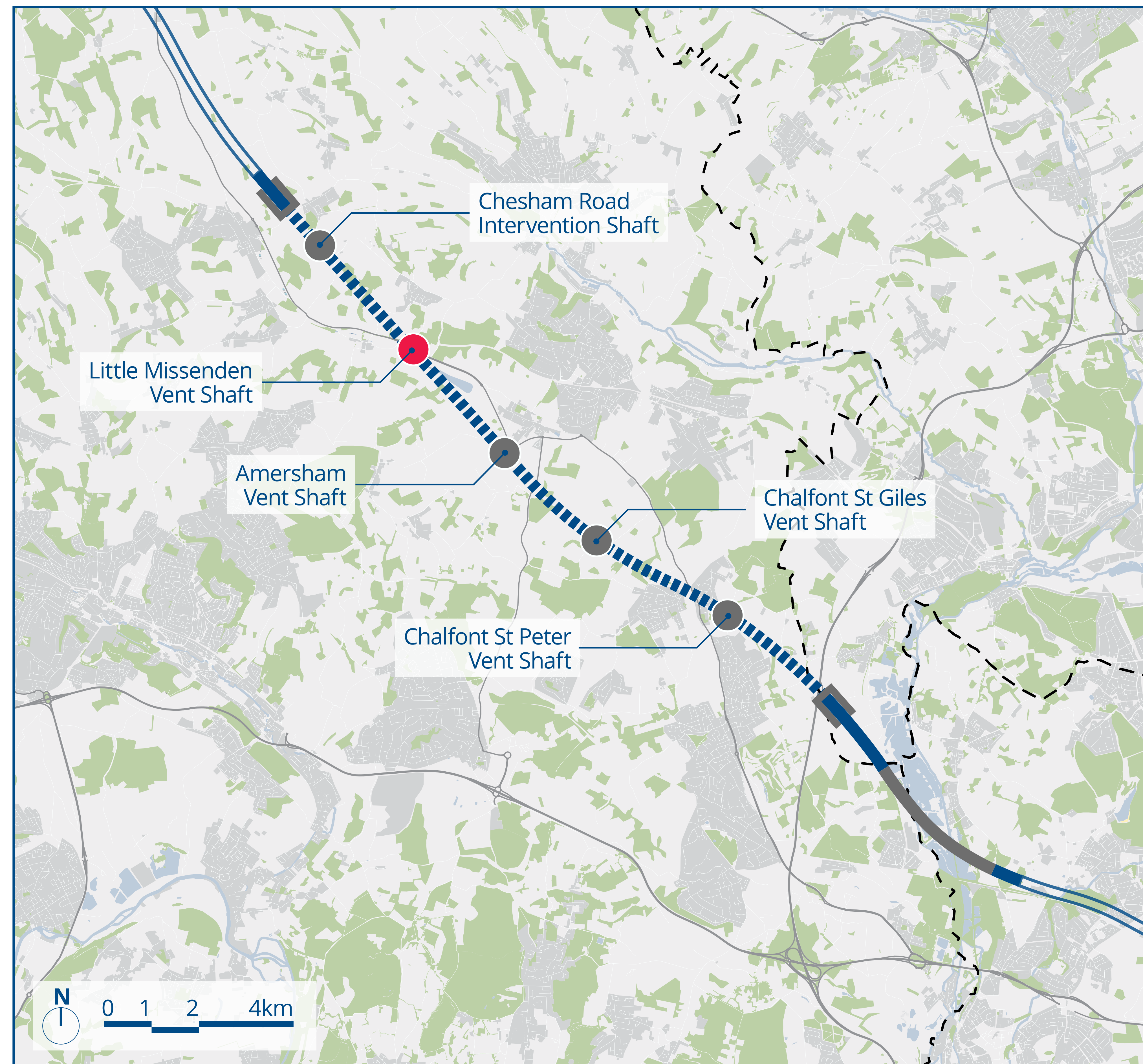
The information in this exhibition is presented to show you the design for the vent shaft headhouse and landscape, and to share our construction plans. We are also asking for your feedback to help shape our final plans. Your comments will be considered in the next stage of review, which will take place within the next couple of months.

We will keep you informed of any design changes at future 'you said we did' events and webinars.

We would like your views and ideas on the following topics:

- Landscape design
- Ecology
- Design of the vent shaft and headhouse
- Construction

## HS2 route through the Chilterns



Little Missenden vent shaft will provide air ventilation and access for emergency services. It will be located on a parcel of land north of the A413, between Keepers Lane and Mop End Lane.

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# Landscape and site context

## Surrounding Context

We have studied the site and its natural environment to help shape our landscape restoration works. We want to reflect as much as we can the character of native trees and chalk grasslands in the Chilterns Area of Outstanding Natural Beauty to positively integrate the new building into the landscape.

- Key
- 1 Retained vegetation
  - 2 Public right of way - - -
  - 3 Views from elevated ground
  - 4 Removed trees
  - 5 Site area - - - -



View from footpath southeast of site



Context plan

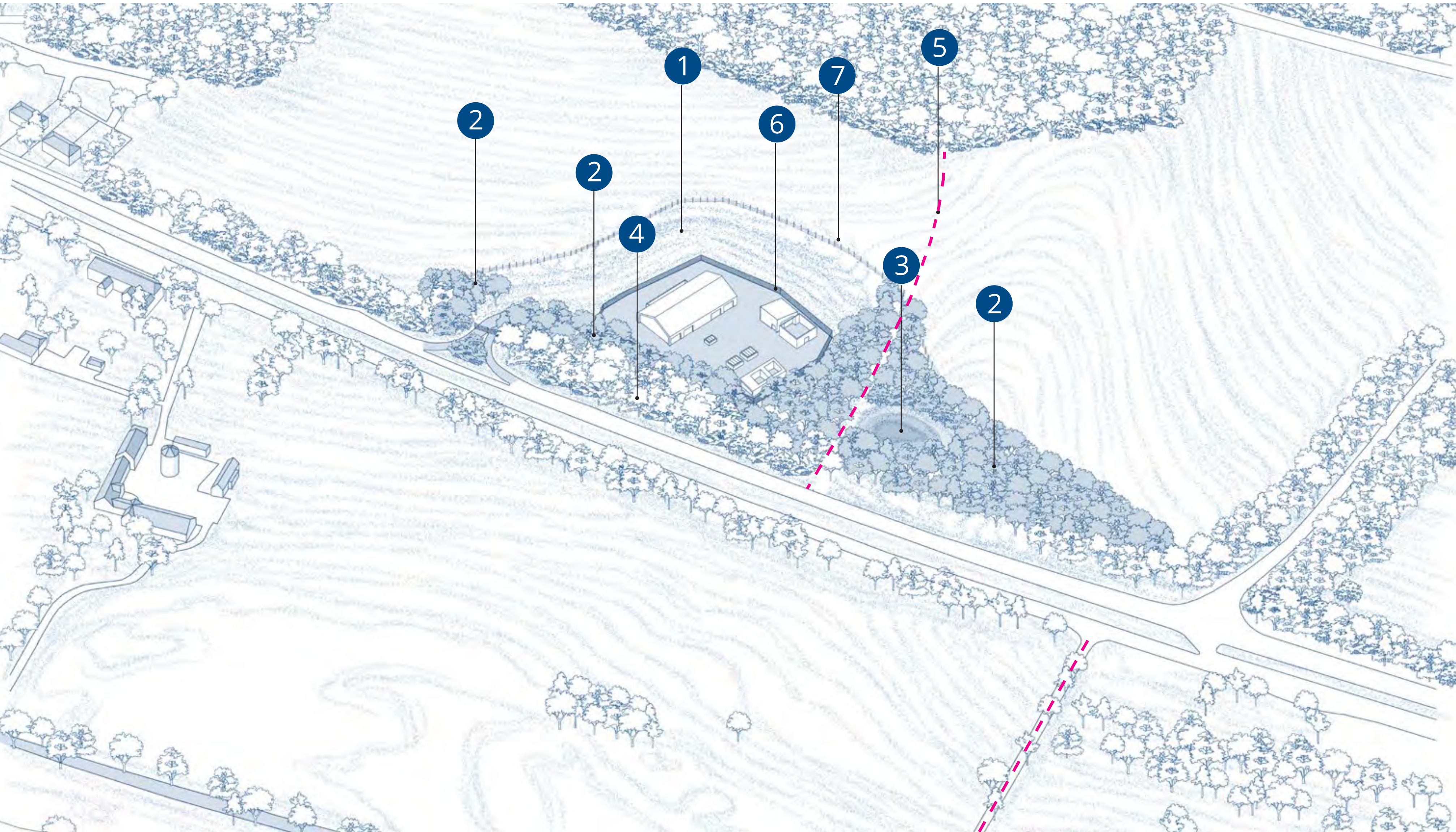


# Landscape design

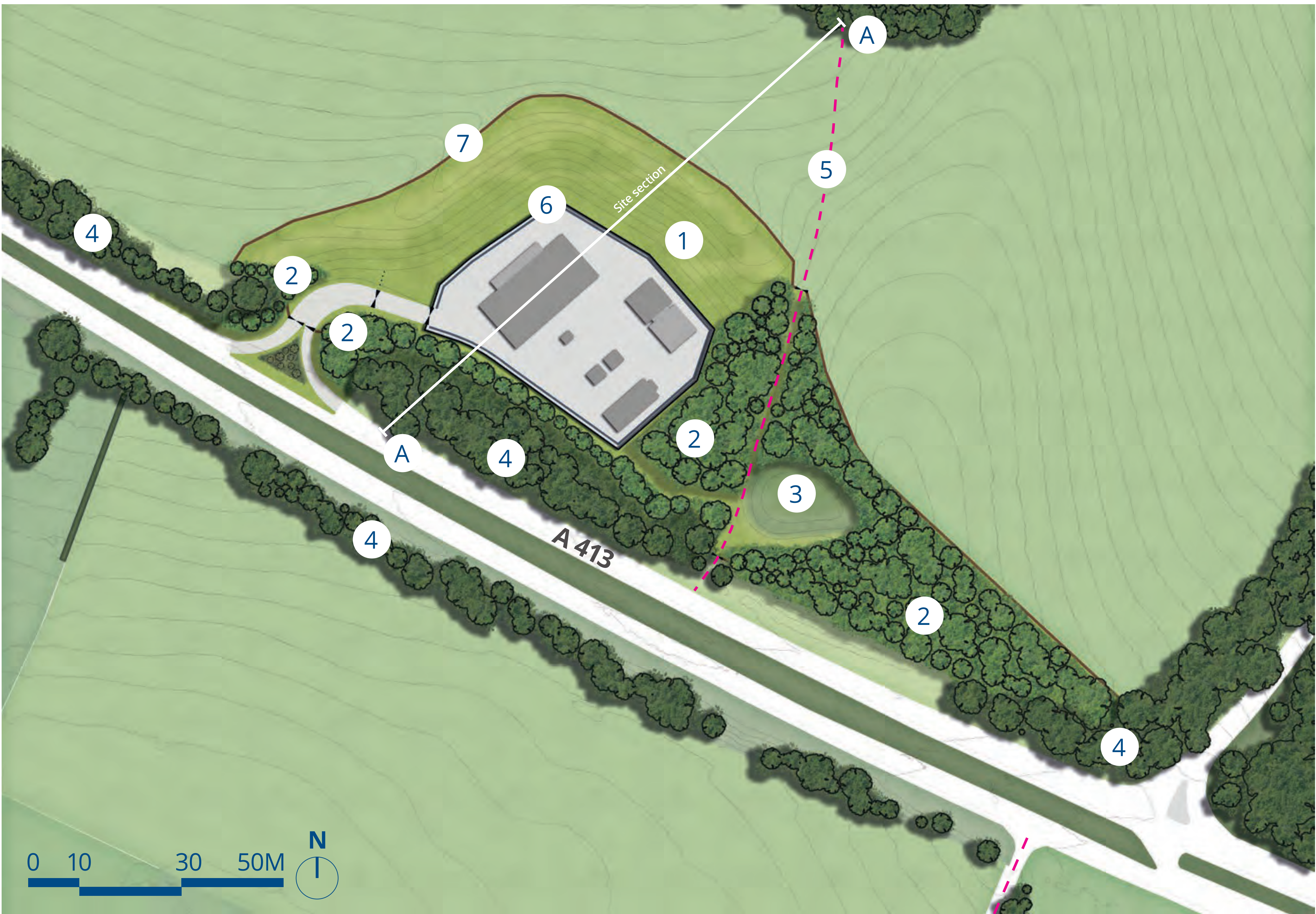
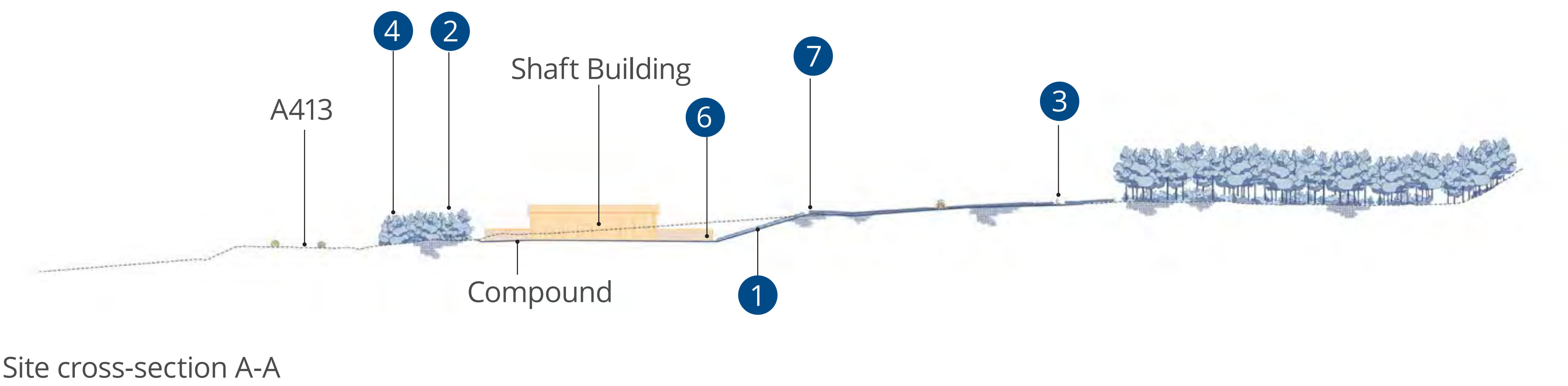
## Proposed Landscape

The landscape proposals complement the approach adopted in the architecture, with earthworks and planting used to screen the buildings and integrate the site into the surrounding landscape.

- Key**
- 1 Species rich grassland
  - 2 Proposed woodland planting
  - 3 Drainage basin
  - 4 Retained woodland and vegetation
  - 5 Public right of way - - -
  - 6 Security fence
  - 7 Boundary fence



Site sketch



Landscape plan



# Ecology

## Ecological Design

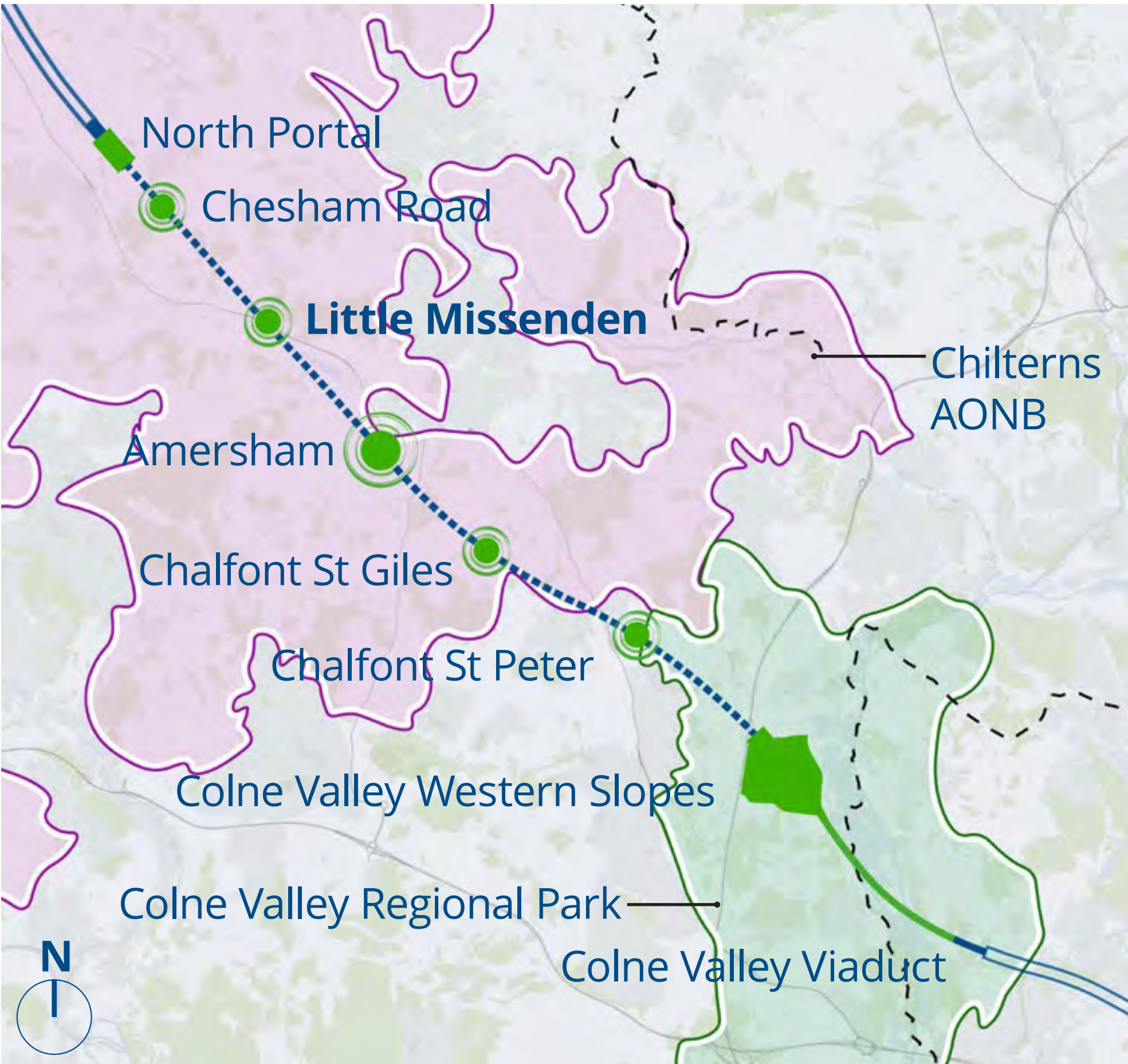
The ecological design is based on the site being one of five Chiltern Tunnel shaft sites that would form ecological stepping stones through the Chilterns Area of Outstanding Natural Beauty. It will significantly improve biodiversity by integrating with the existing surrounding habitats and through the creation of appropriate species-rich grassland with areas of planting and basking banks further increasing the value of the habitat for wildlife.



Species rich calcareous grassland

Key

- 1 Species rich grassland
- 2 Tree planting
- 3 Basking banks
- 4 Public right of way - - -



Ecological stepping stones



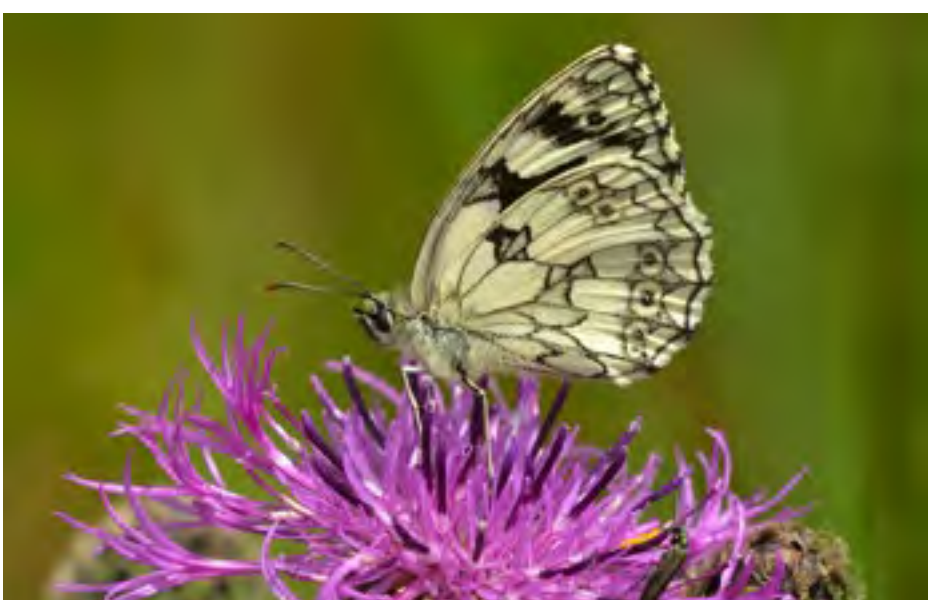
Basking banks



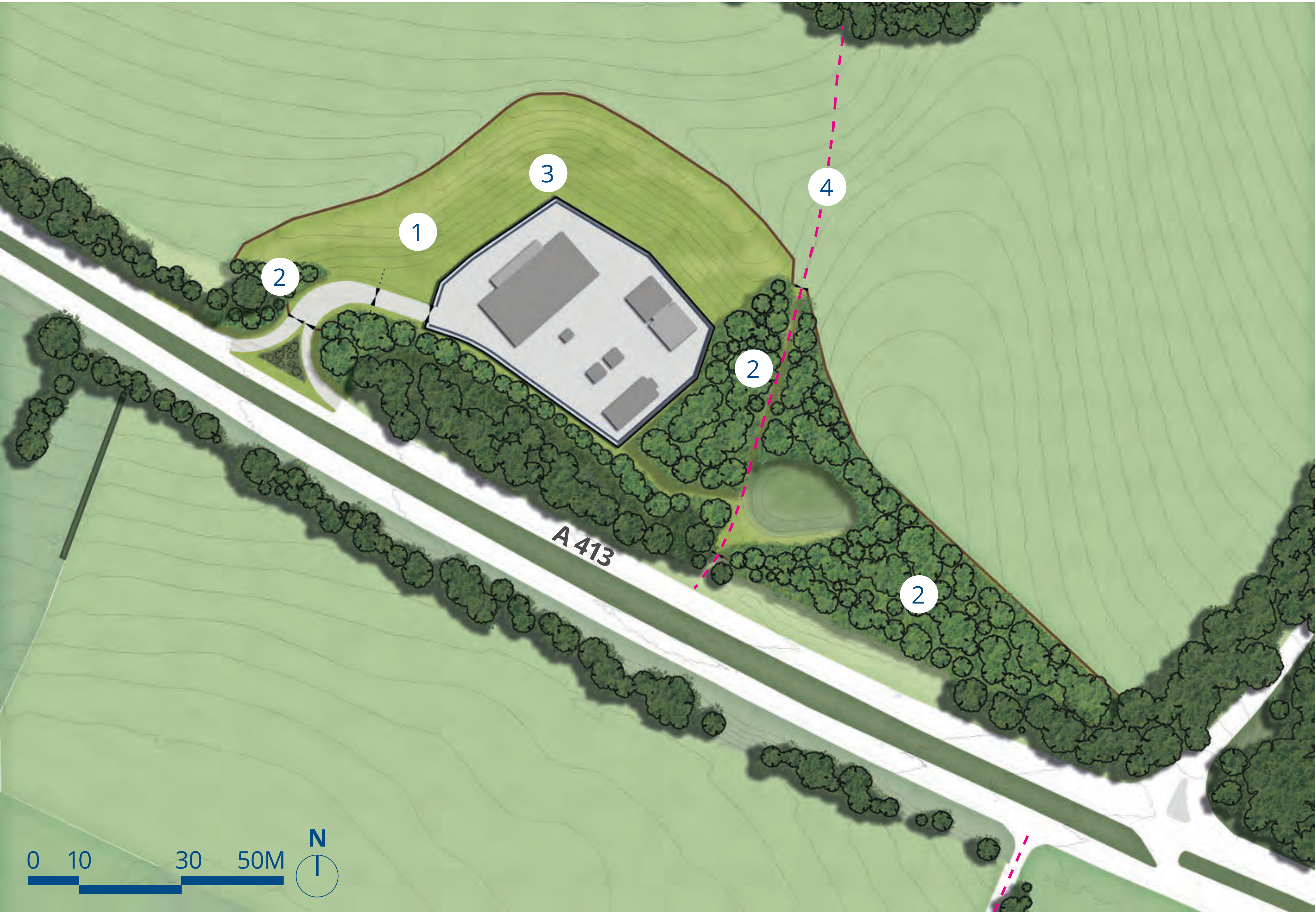
Slow worm



Foraging insects



Complex wildflower habitats



Landscape masterplan

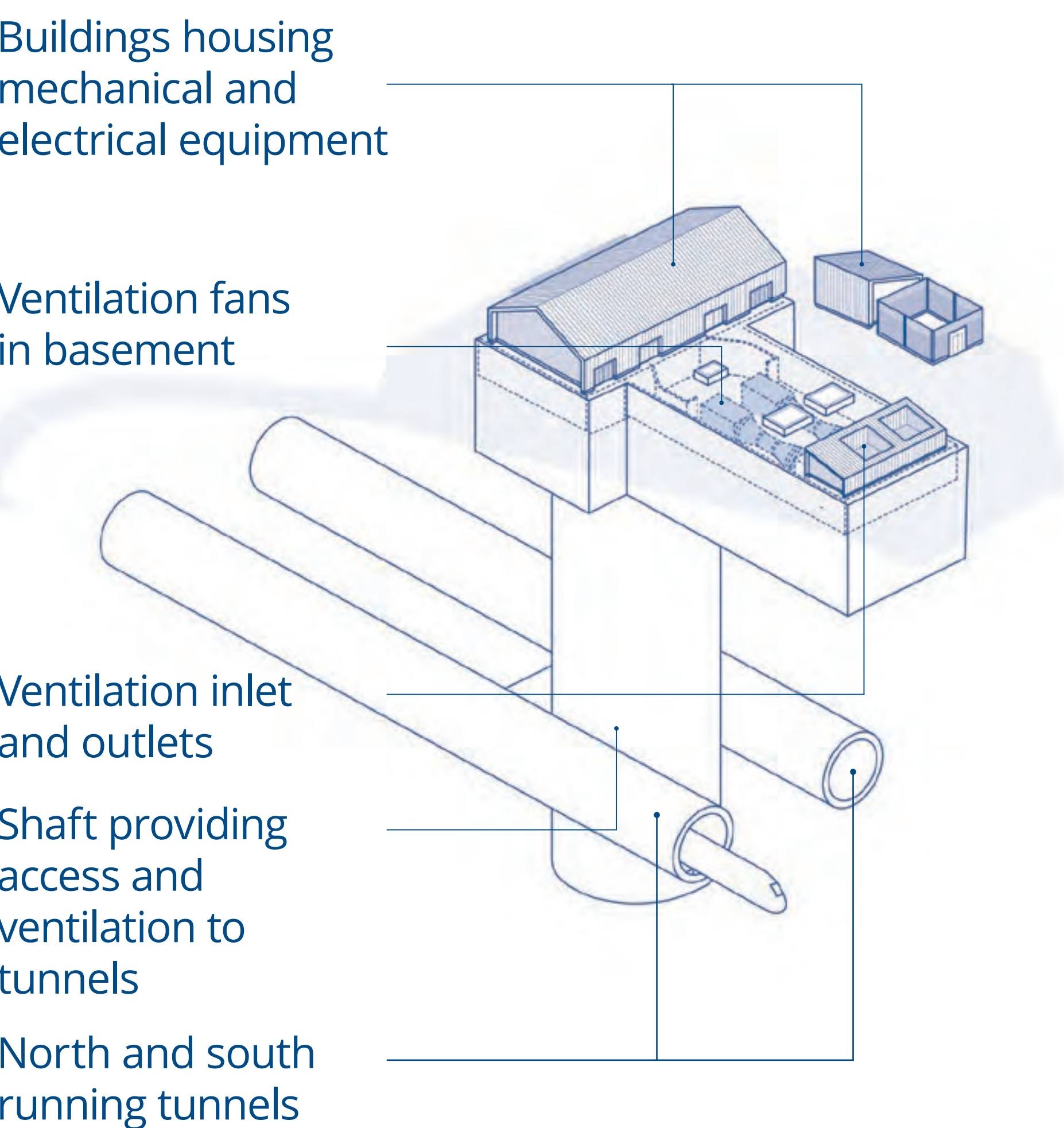


# Headhouse design

## Functional Requirements

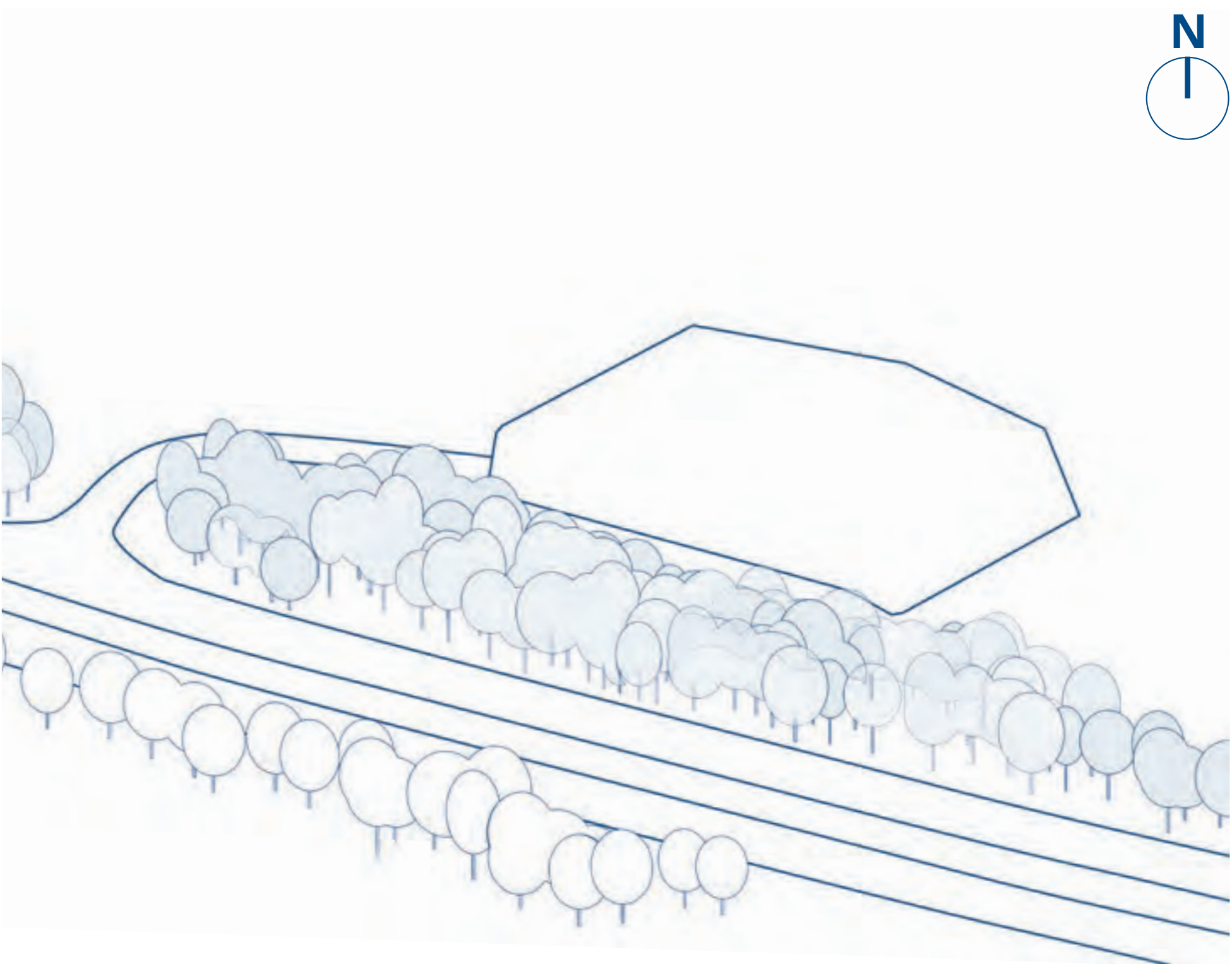
The function of the headhouse is to provide:

- Ventilation to control tunnel environment
- Mechanical and electrical equipment to support the operation of the railway
- Intervention access point for emergency services

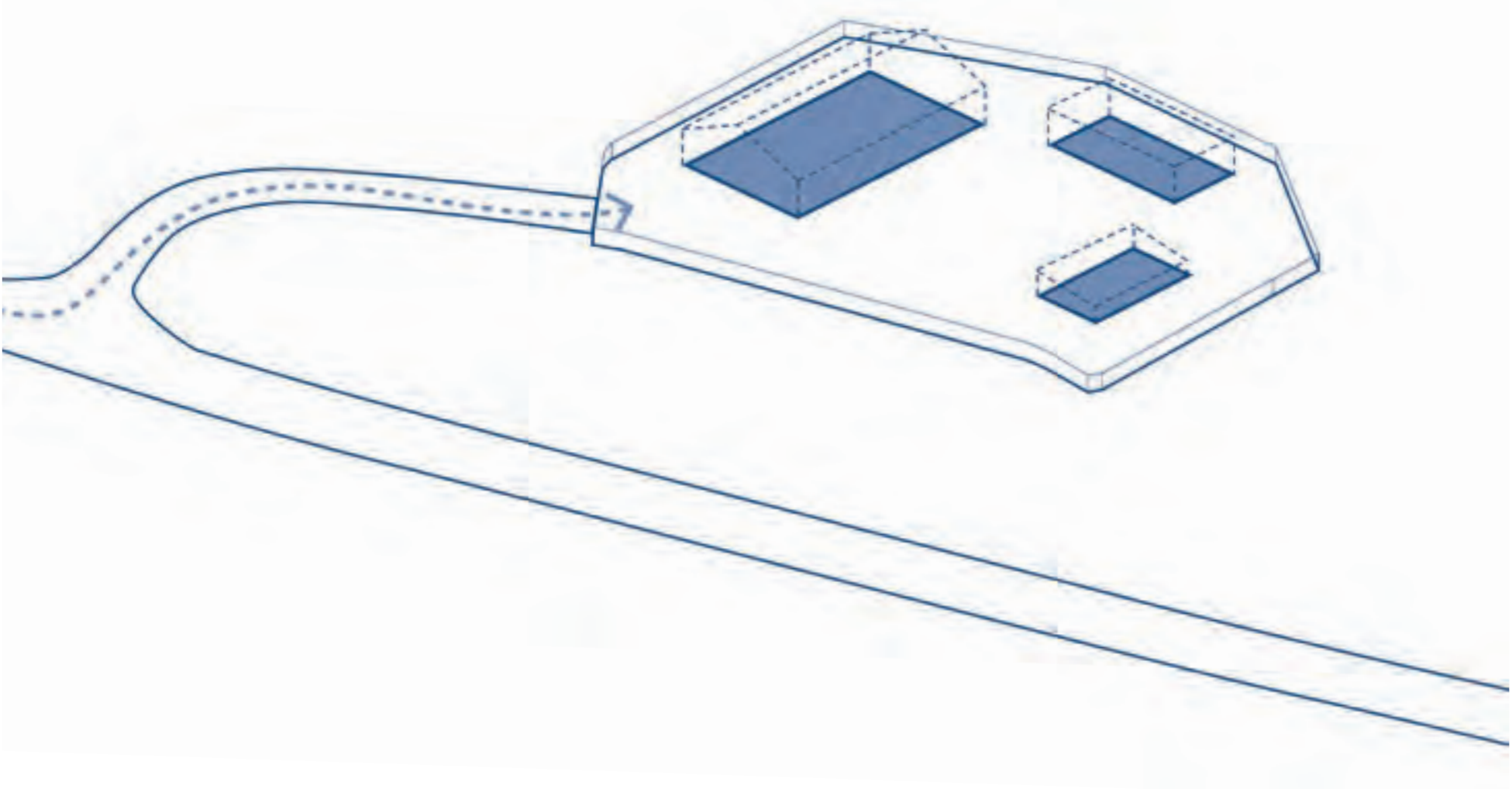


3D diagram - Little Missenden vent shaft headhouse

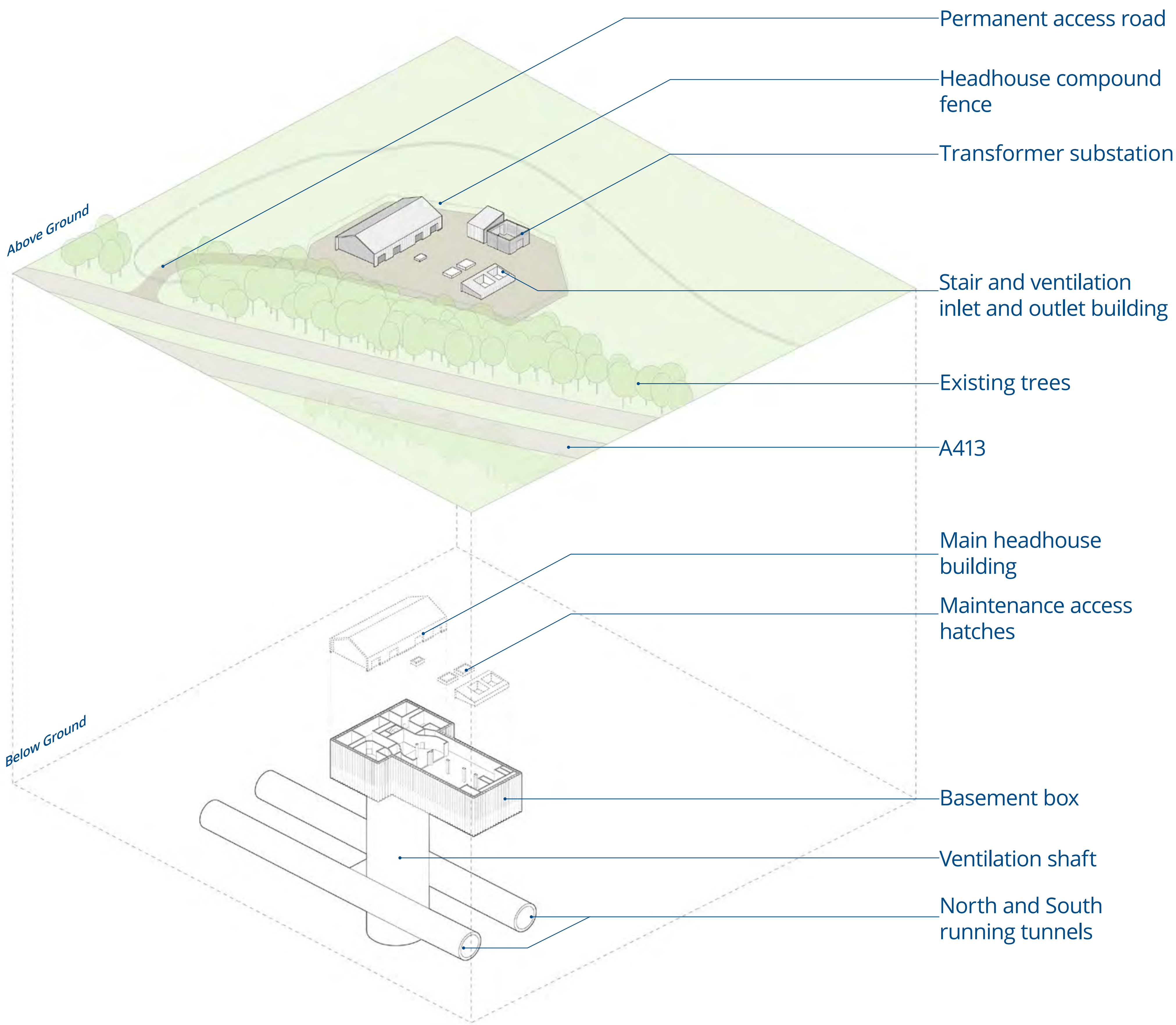
## Site Response



Integration within landscape - Setting compound into the hillside and planting of additional trees to reduce visual impact



Agricultural courtyard arrangement - Based on typical agricultural courtyard with the overall footprint kept as small as possible.



3D View - Little Missenden vent shaft and headhouse



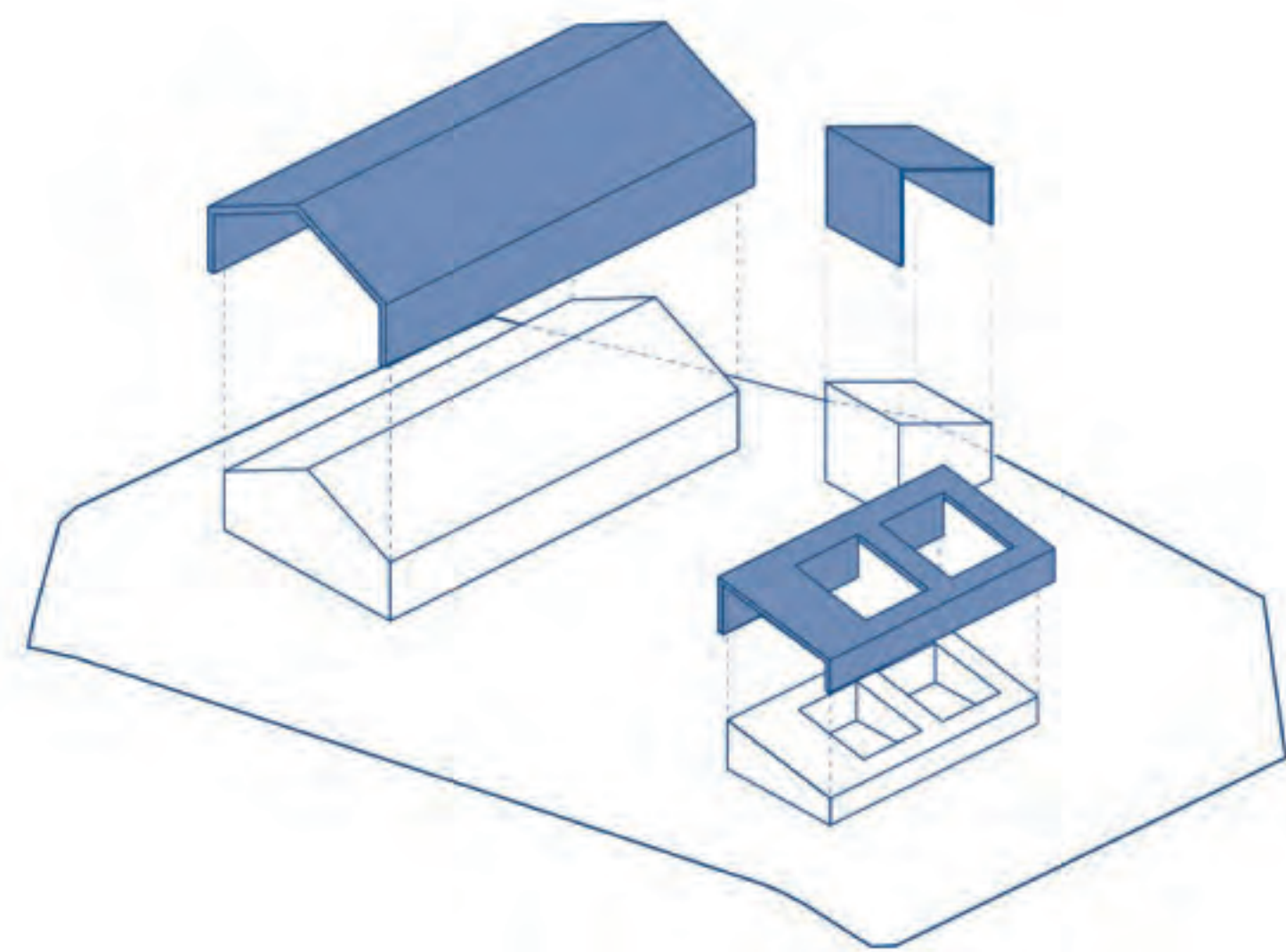
# Headhouse design

## Building Design Principles

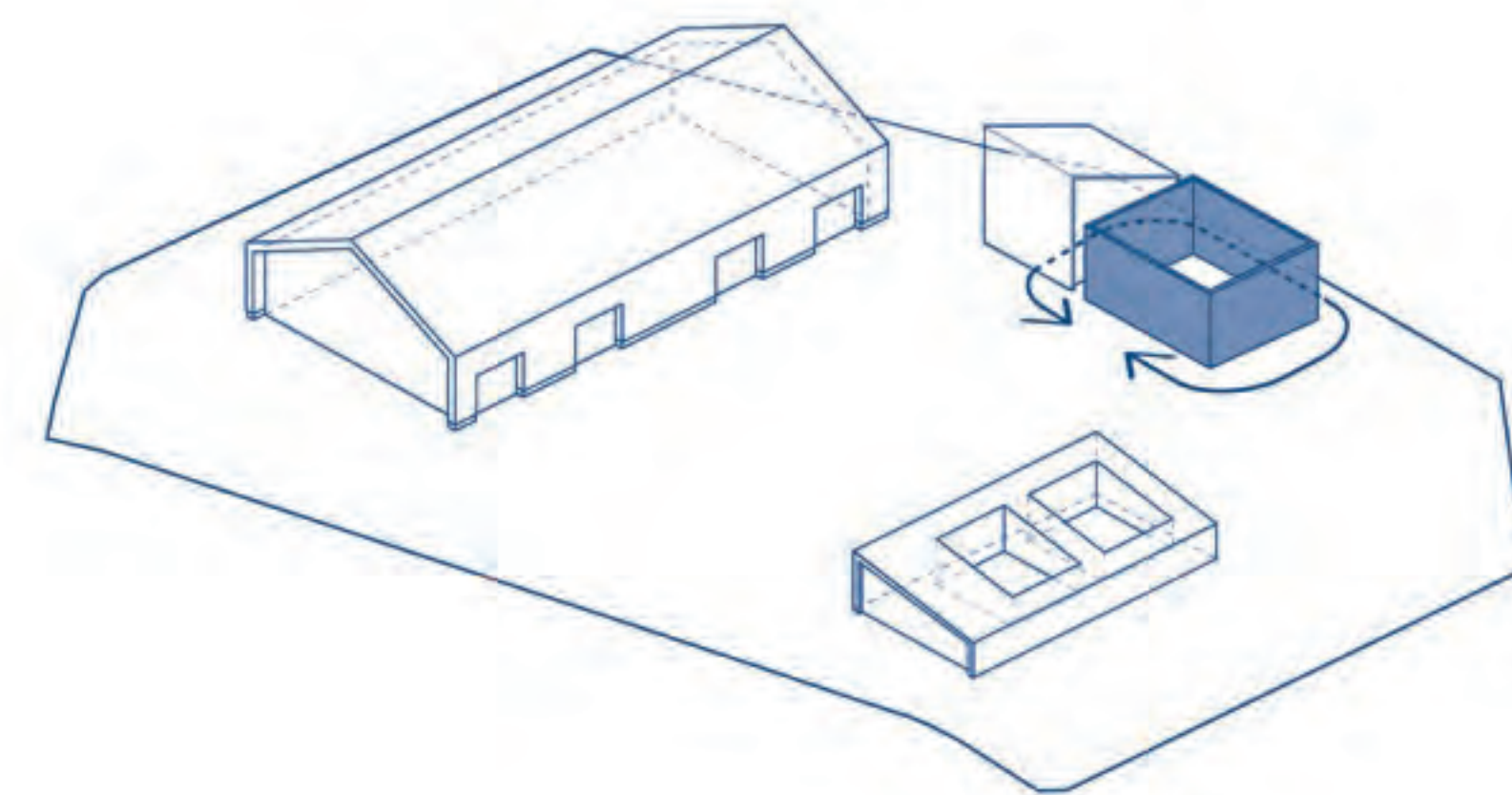
A clear set of design principles have been employed to achieve sensitivity. The building colour and detail has been designed to blend into the landscape, using a simple palette of materials inspired by the local agricultural buildings.

### Key

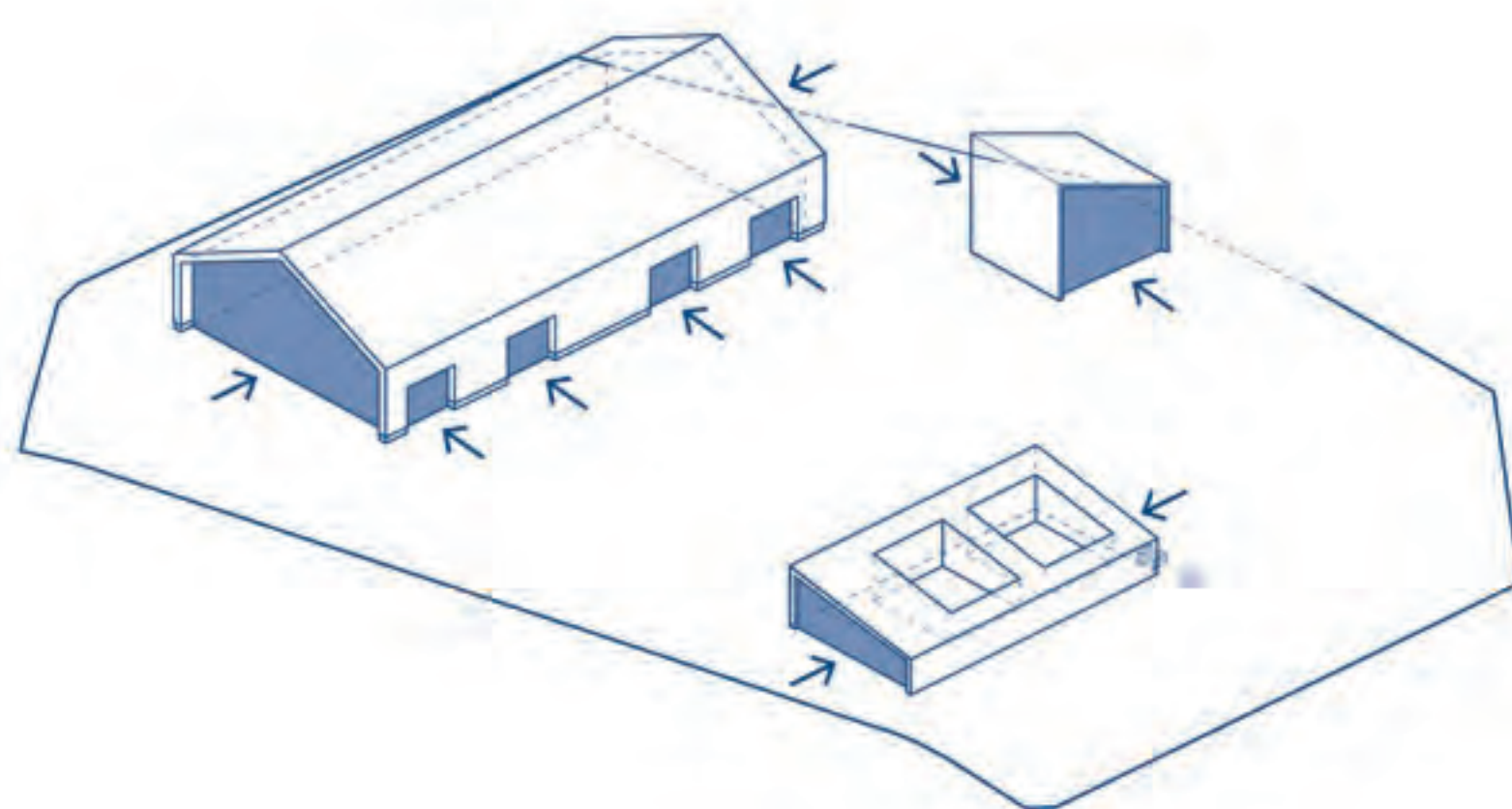
- 1 Main headhouse building
- 2 Stair and vent building
- 3 Autotransformer station
- 4 A413
- 5 Keepers Wood



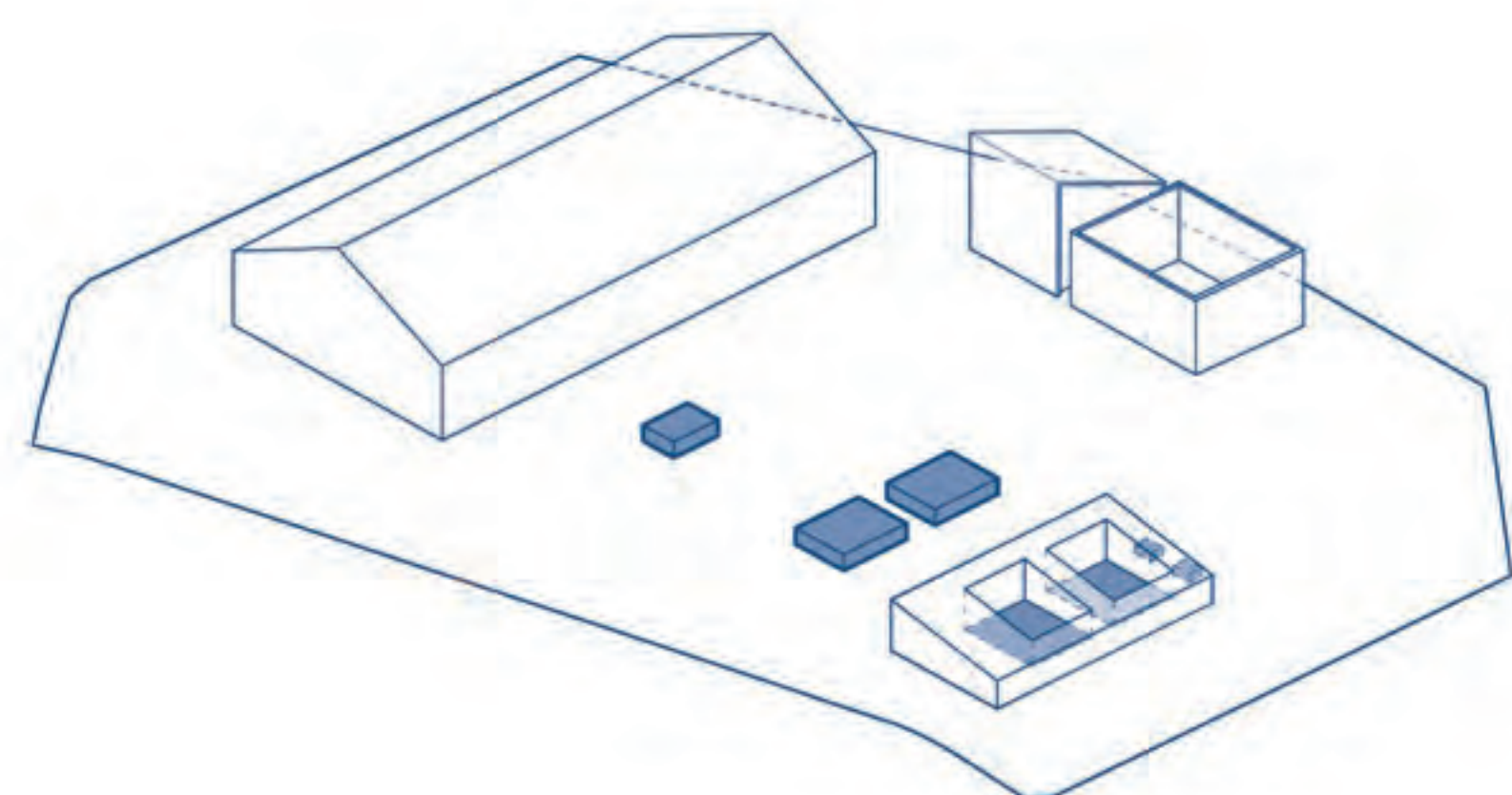
Roof wrap - The pitched roofs wrap around the buildings, creating simple agricultural barn shapes



Substation - Transformer equipment enclosed by louvered steel screen



Door and vents - Openings are pushed inwards and treated in a different material, similarly to local agricultural buildings



Access hatches and ventilation outlets - Components are kept low and concealed as much as possible to minimise visual clutter



Visualisation - Aerial view (Year 15)



# Headhouse design

## Historic Precedents

Historic agricultural buildings in the surrounding area have influenced the design proposals, in particular the simple pitched roof forms and horizontal cladding.



Local context - Skippings Barn



Local context - Northolt Barn

## Materials

The material palette will be durable and designed to age naturally over time without compromising robustness or quality. Dark, neutral colours will ensure the buildings appear recessive within their surrounding context.



Roof wrap - Pre-patinated zinc

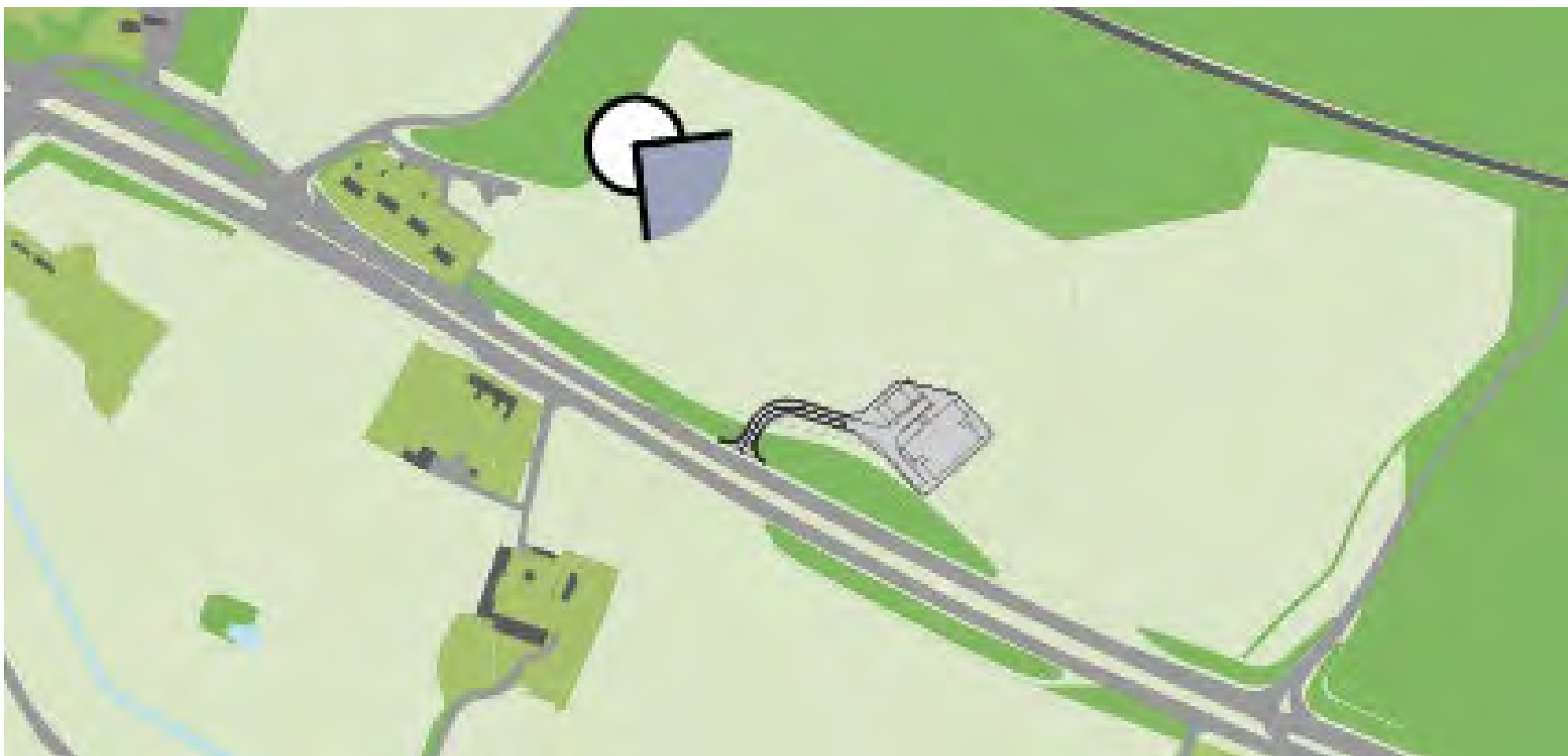


Louvres - Painted steel



Plinth - Engineering brick

## Visualisations



Environmental View Key Plan



Visualisation - View from A413 Amersham Road (Year 1)



Visualisation - View from A413 Amersham Road (Year 15)



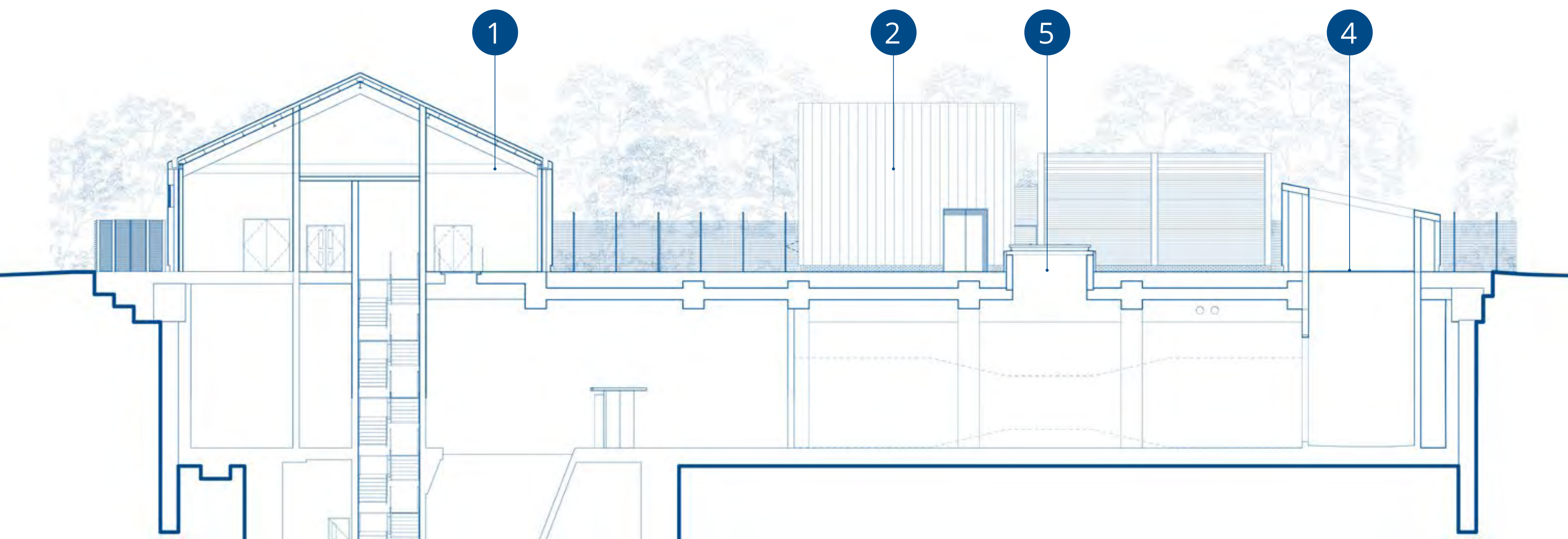
# Headhouse design

## Scale & Appearance

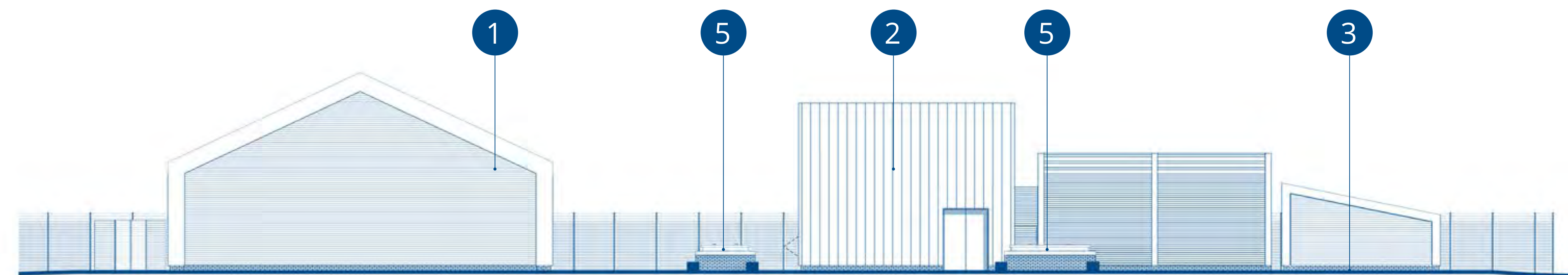
The form and orientation of the buildings have been designed to reduce their scale when seen from key viewpoints. The openings within the buildings have been sized in proportion to the buildings, whilst the ridge line of the pitched roofs help to lower their apparent height.

### Key

- 1 Main headhouse building
- 2 Autotransformer Station
- 3 Stair building
- 4 Ventilation inlet and outlets
- 5 Access hatches



Site section - Proposed headhouse buildings section



Elevation- Headhouse buildings

## Visualisations



Environmental View Key Plan



Visualisation - View from the east (Winter Year 1)



Visualisation - View from the east (Winter Year 15)



# Headhouse design

## Family of Headhouses

Little Missenden is one of five headhouses located on rural sites within the Chilterns. All headhouses and ancillary structures, except Amersham, have been designed to be recessive and form part of a common family of buildings. They are distinguished by the colour of painted louvres, selected to reflect the specific features of each site.



Visualisation - Chalfont St Peter headhouse (Year 15)



Visualisation - Little Missenden headhouse (Year 15)

## Site Response



Headhouse location map

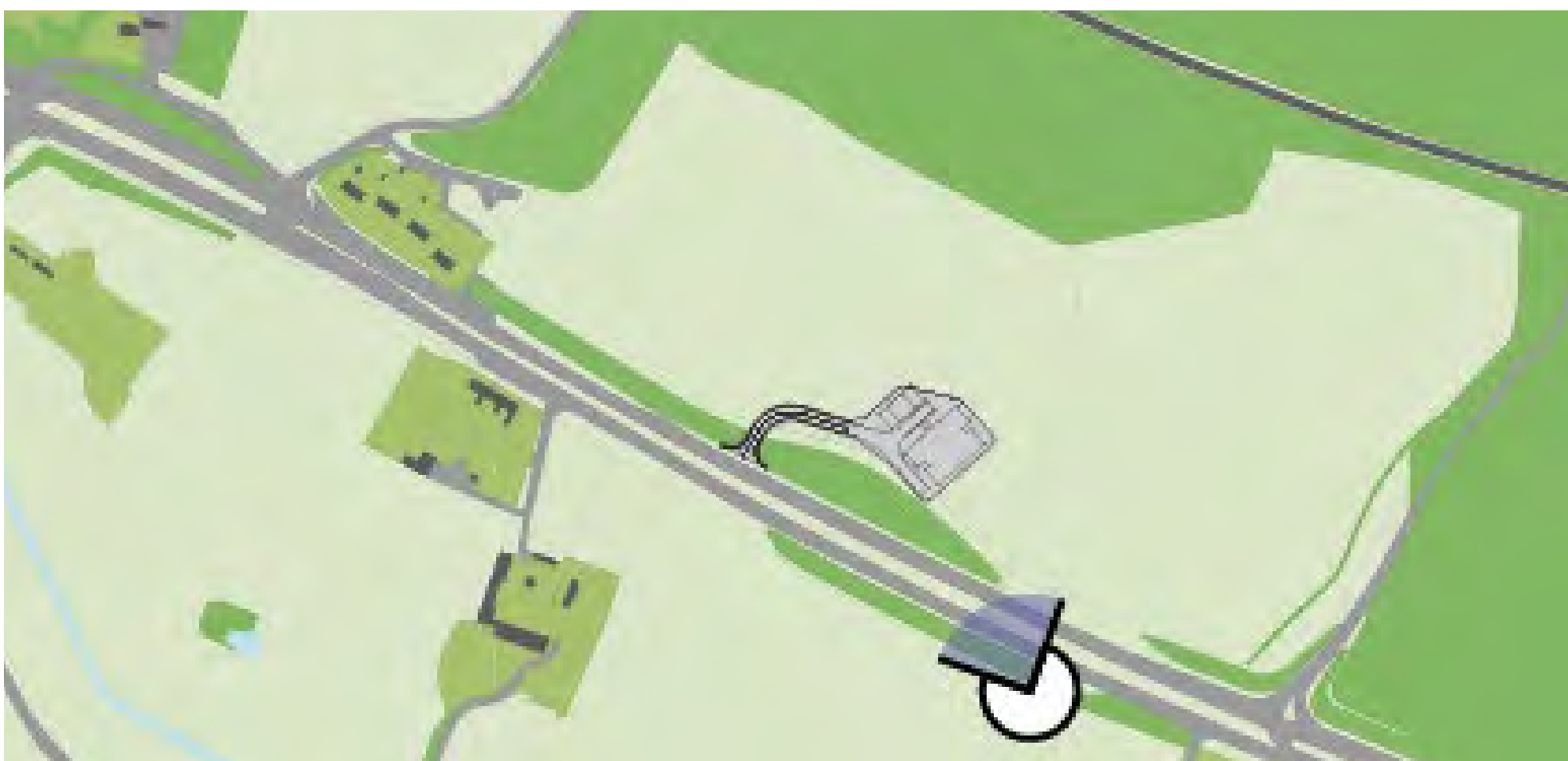


Visualisation - Chalfont St Giles headhouse (Year 15)



Visualisation - Chesham Road headhouse preliminary (Year 15)

## Visualisations



Environmental View Key Plan



Visualisation - View looking West from A413 Amersham Road (Winter Year 1)



Visualisation - View looking West from A413 Amersham Road (Winter Year 15)



# Traffic management and planning

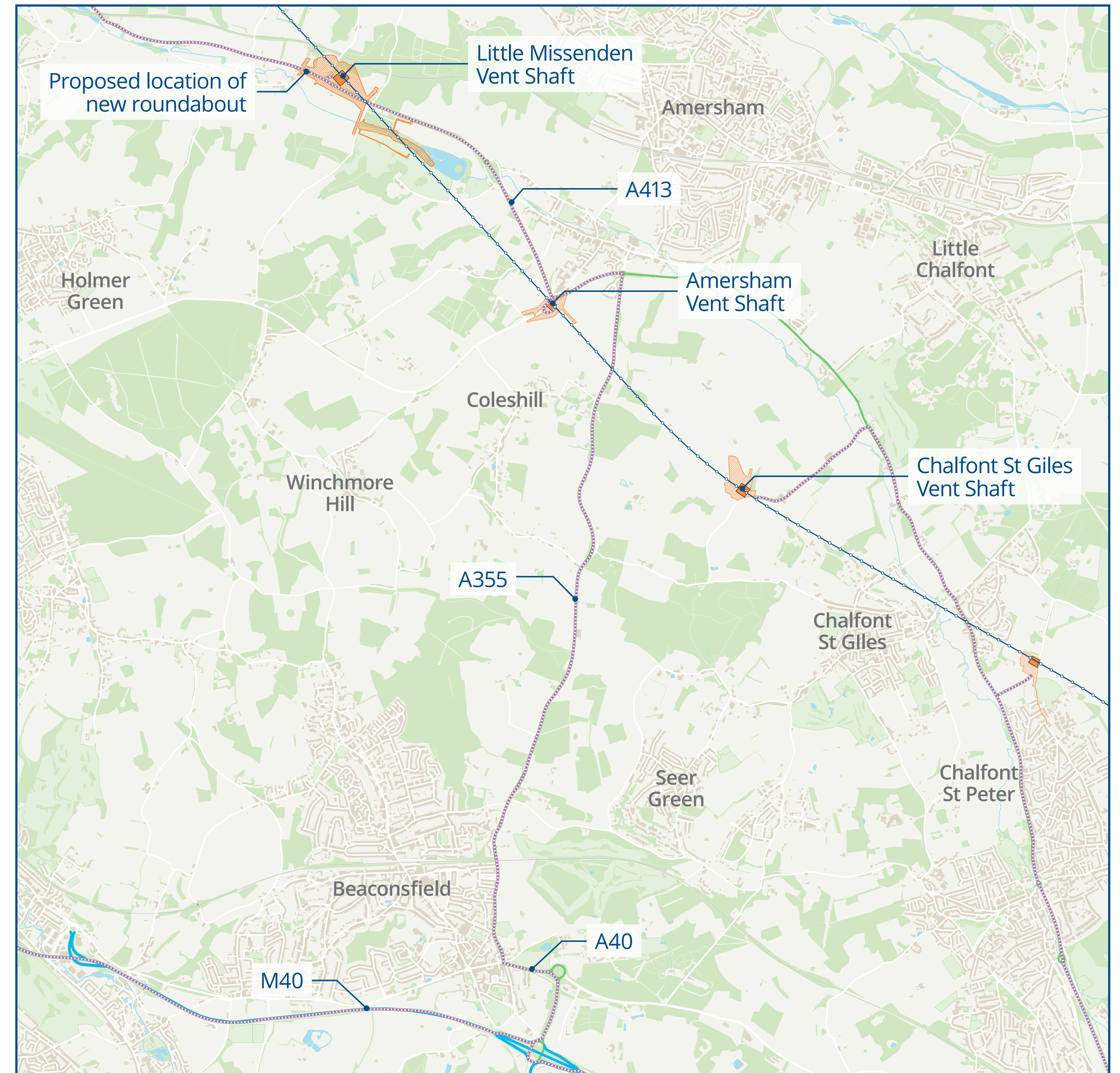
We recognise that there are concerns regarding Heavy Goods Vehicles using local roads in Little Missenden. Our routes to each site are carefully planned to reduce any impact on local communities.

During stages of high activity on site – such as shallow shaft excavation, grouting and piling works – there will be a corresponding increase in Heavy Goods Vehicle (HGV) movements. There will also be periods where the need for HGV movements will be lower.

We have been working closely with local stakeholders to review the access into the vent shaft site and reduce the impact of HGV movements on the local community.

We are:

- Reducing the number of HGV movements by reducing the size of the vent shaft excavation needed
- Stockpiling excavated soil on site
- Scheduling all deliveries electronically to prevent congestion near the site
- Reviewing access to the site to reduce congestion and simplify traffic movements.
- We are proposing a temporary roundabout on the A413 at the junction with Highmore Cottages.





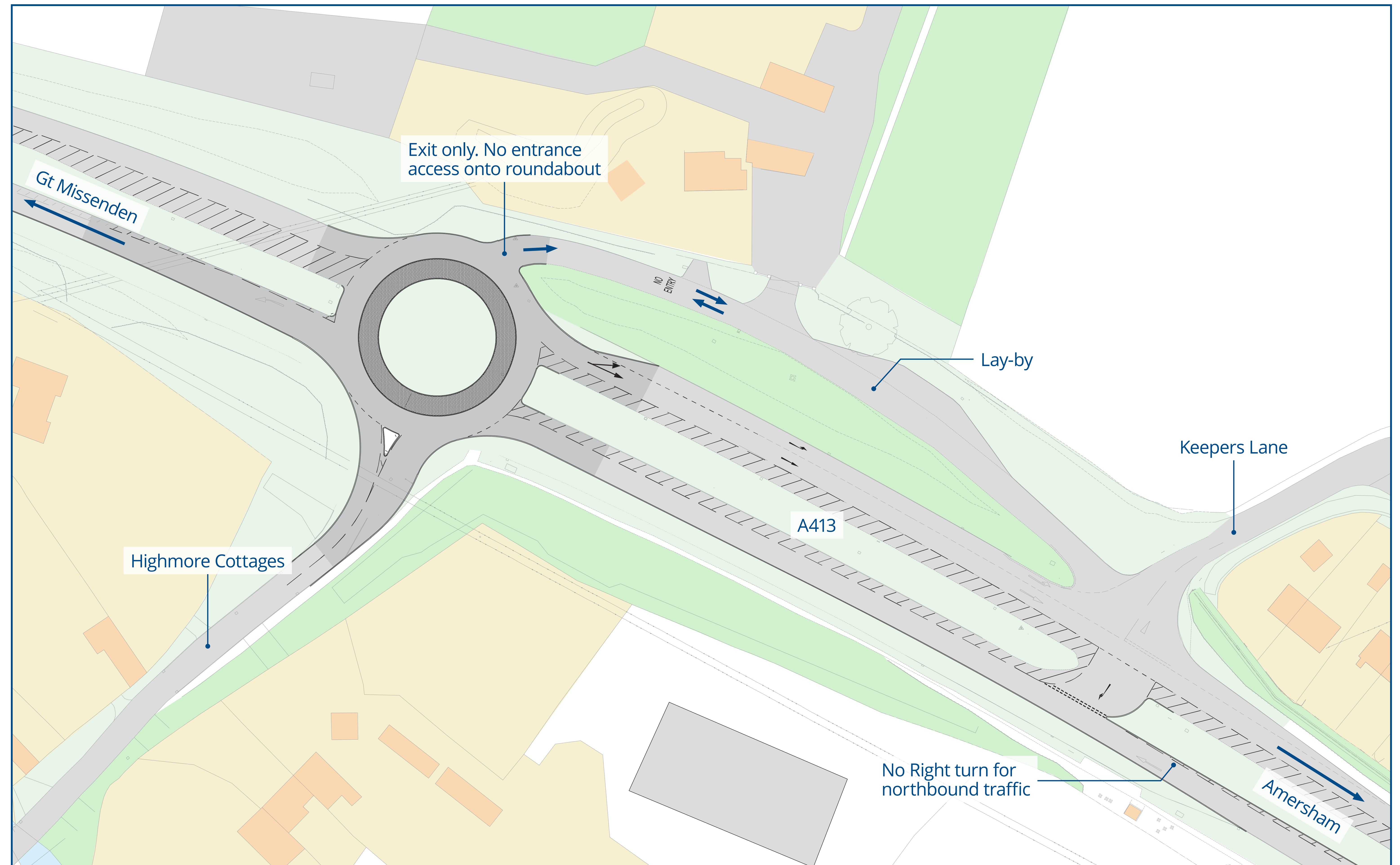
# Local access improvements

We are proposing a new roundabout at the junction with Highmore Cottages and A413.

The proposed route that our HGVs will take to access the site is from the south. We have been looking at ways that we can access the site safely. Following this we are proposing a new roundabout at the junction of Highmore Cottages. This will include removing the right hand turn into Keepers Lane from the northbound carriageway as annotated on the map.

This will improve safety:

- For vehicles entering and exiting the village and Keepers Lane
- We will be reducing the speed limit in this area, which will improve safety at the junction of the A413 and the unnamed road (south east of the vent shaft site)
- This is our preliminary design and it will be subject to consent applications to Buckinghamshire Council.



Preliminary design for roundabout



# Construction site map

We will build the vent shaft as quickly and safely as possible, and minimise our impact on the local community.

## Air quality

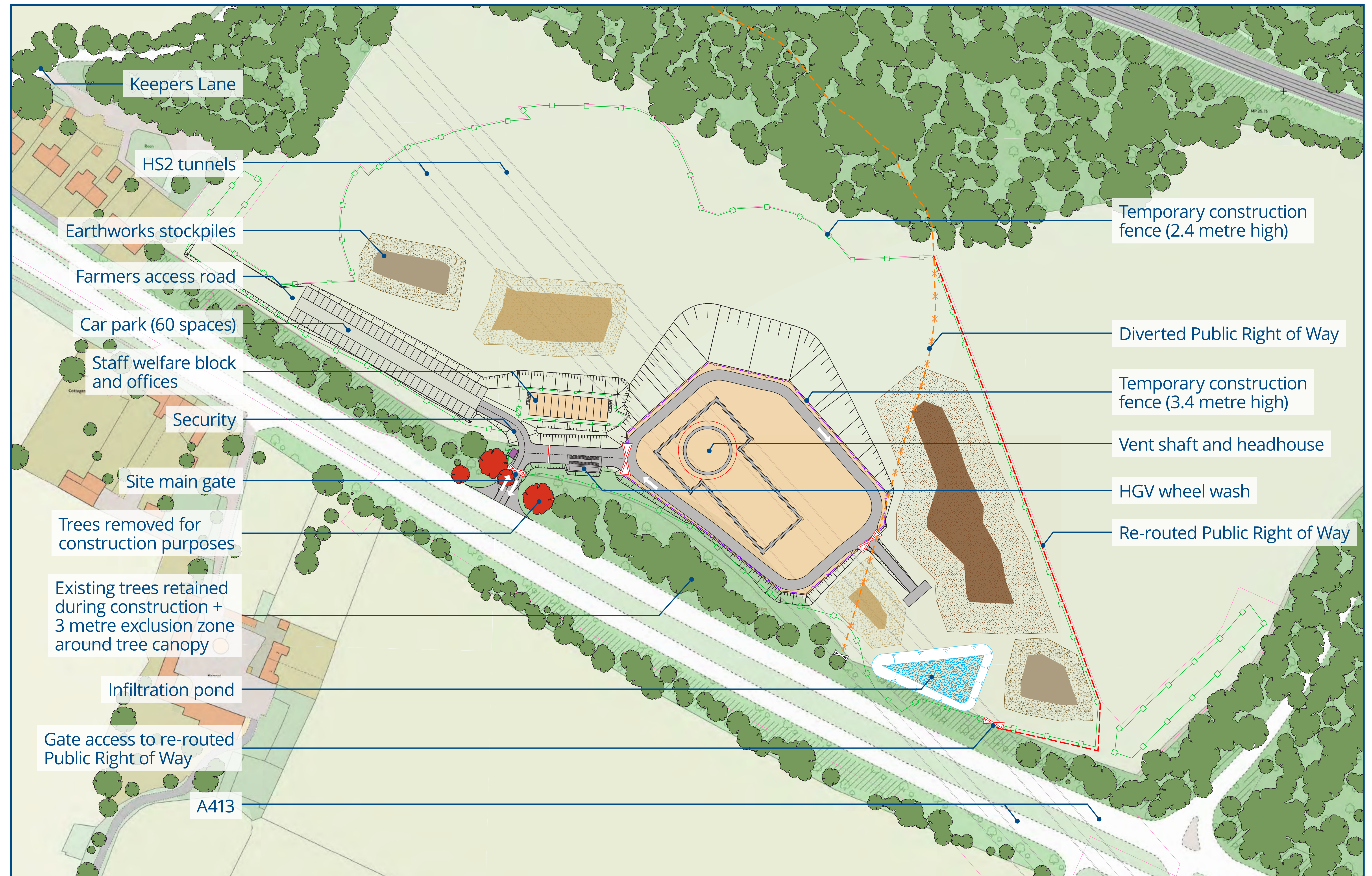
We will manage air quality by:

- Regularly inspecting and monitoring site and equipment
- Cleaning onsite roads and vehicles
- Managing earthworks to contain dust
- Monitoring air quality on site

## Noise

We will control noise and vibration by:

- Monitoring noise using automatic monitoring equipment
- Tackling noise at source and reviewing location of equipment
- Screening and enclosing noisy activities



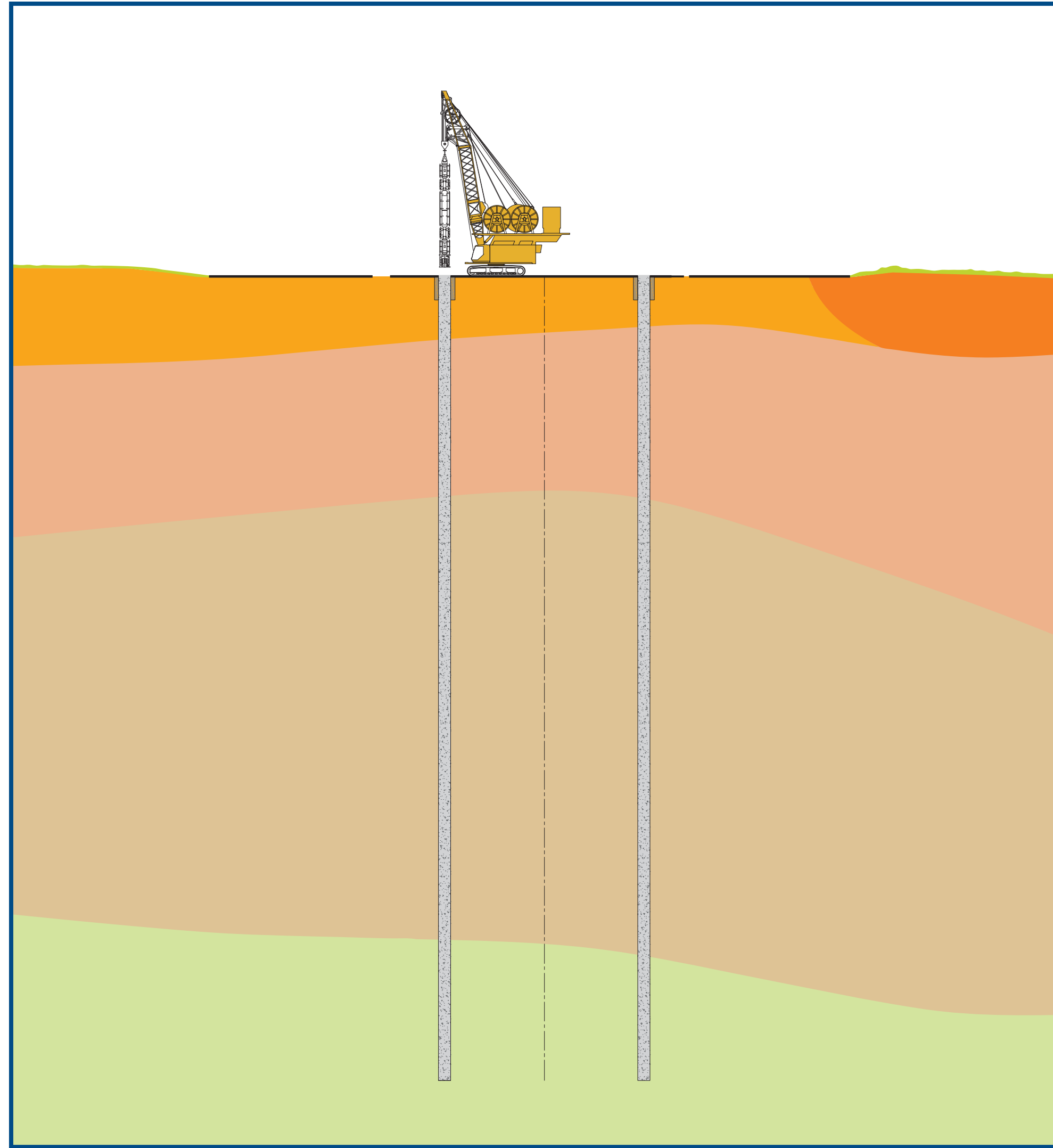
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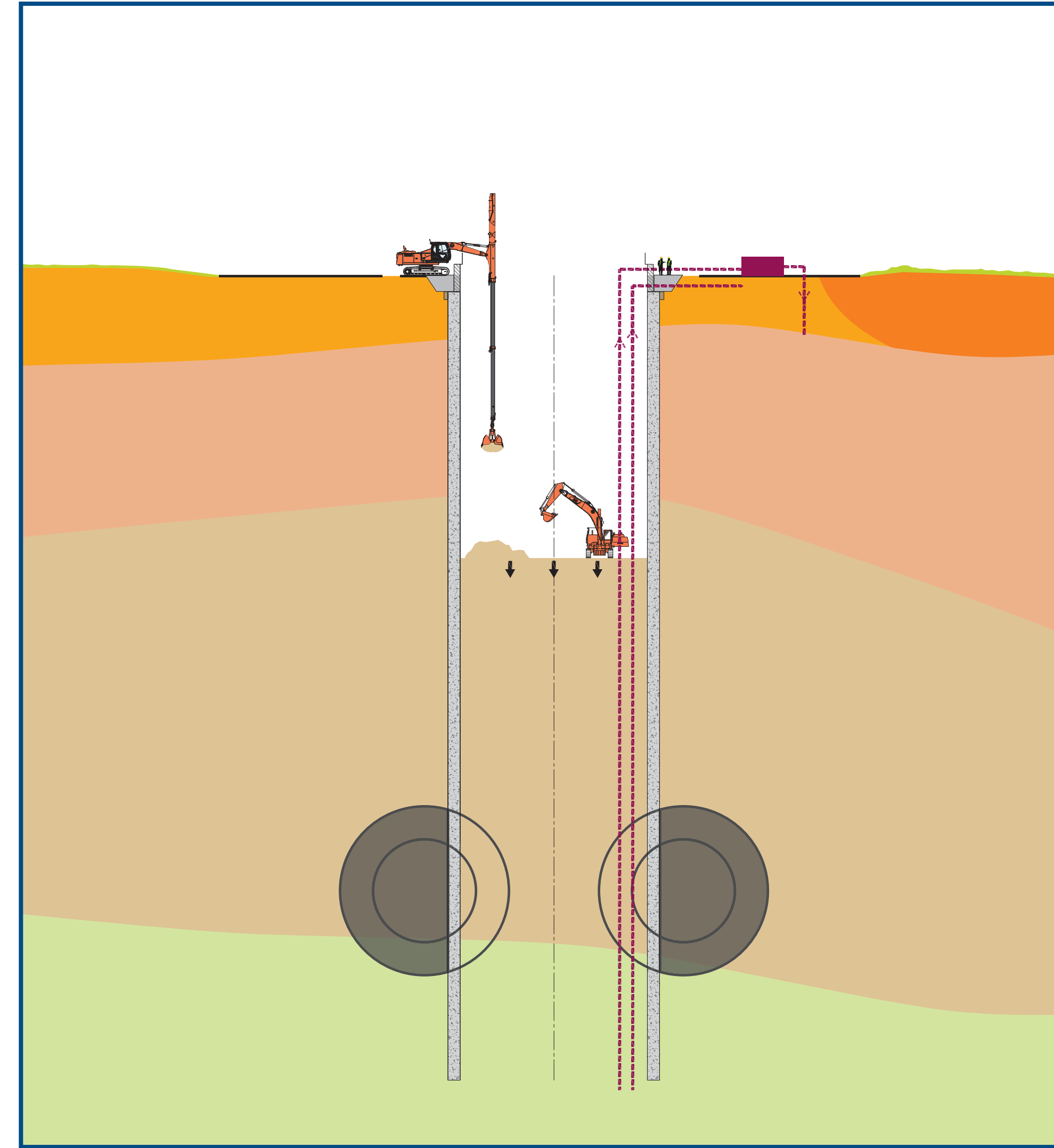
# Building a vent shaft



Outer wall construction

The outer walls of a vent shaft are created using Diaphragm walls (D-walls). These are built from the ground level (top-down). This protects the excavation work from lateral earth pressure and water pressure.

These walls will form the external structure of the finished vent shaft.

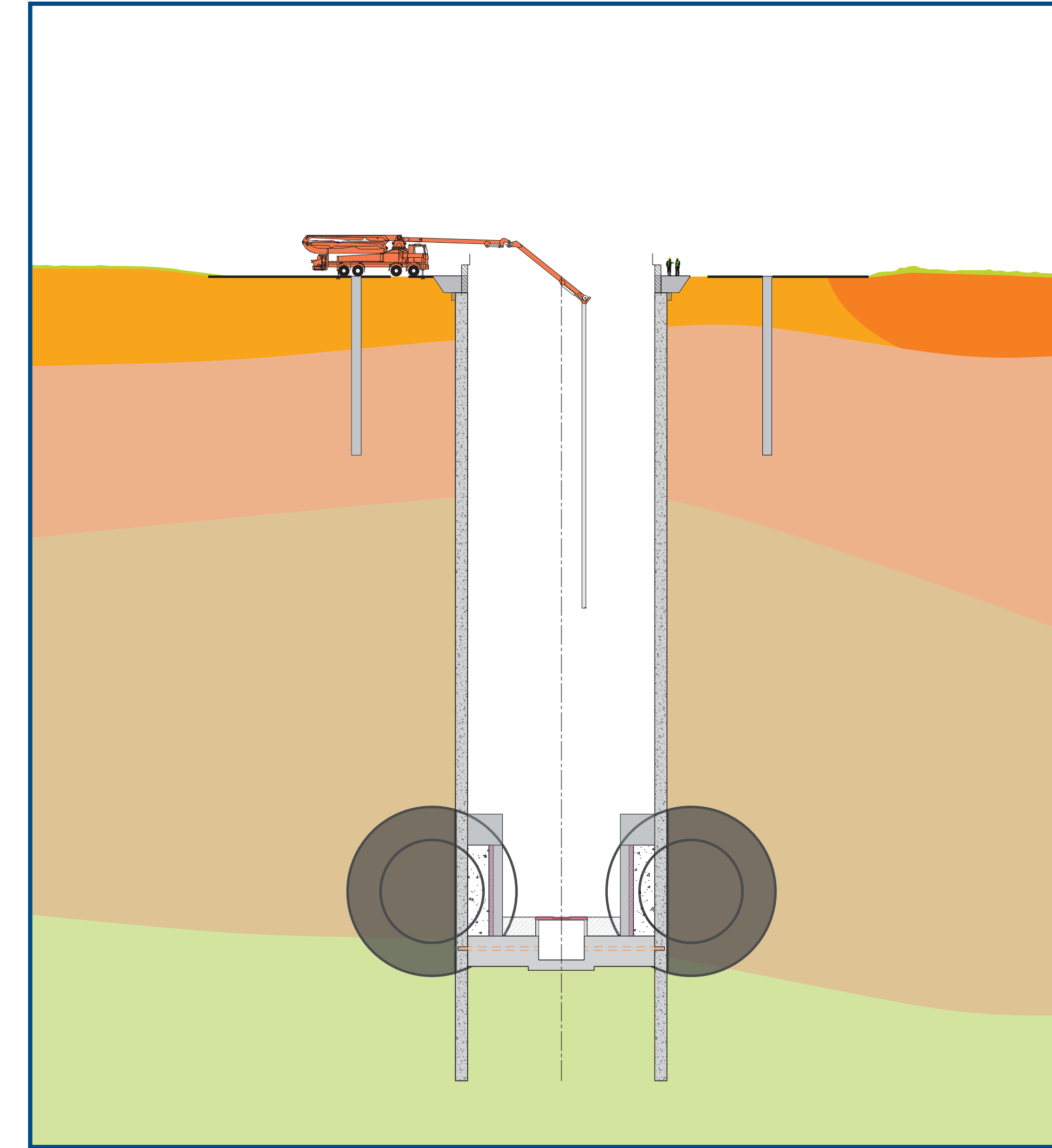


Shaft excavation

The ground around the tunnel entry points is prepared for the arrival of the Tunnel Boring Machines (TBMs).

Earth is removed from within the walls with excavators.

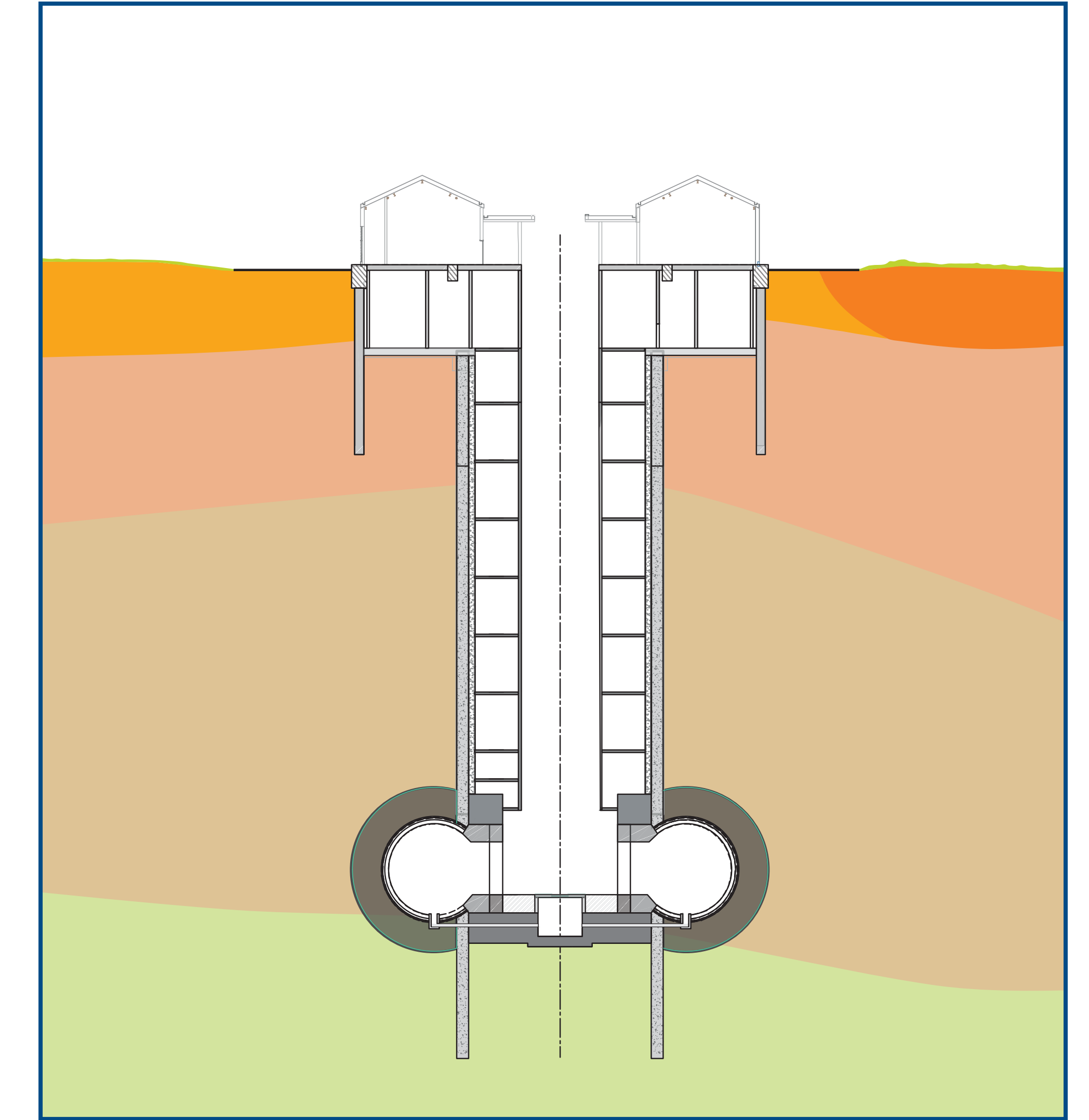
Groundwater in the shaft is pumped out to local recharge wells.



Secant pile, base slab, and collar construction

The outer walls of the headhouse are constructed using a technique called secant piling. When the earth from within the shaft walls has been excavated, concrete is poured into the shaft to create the base slab.

A structure called a collar is constructed to support the shaft when the TBMs arrive and pass through.



Tunnel connection, basement and headhouse construction

The floors, stairs and other internal structures are built.

When both TBMs have passed through the shaft, works to waterproof the tunnel and vent shaft connection can then be completed.

Excavation within the secant pile walls creates the basement of the headhouse where the machinery and controls are installed. The headhouse is built and landscaping of the site is completed.

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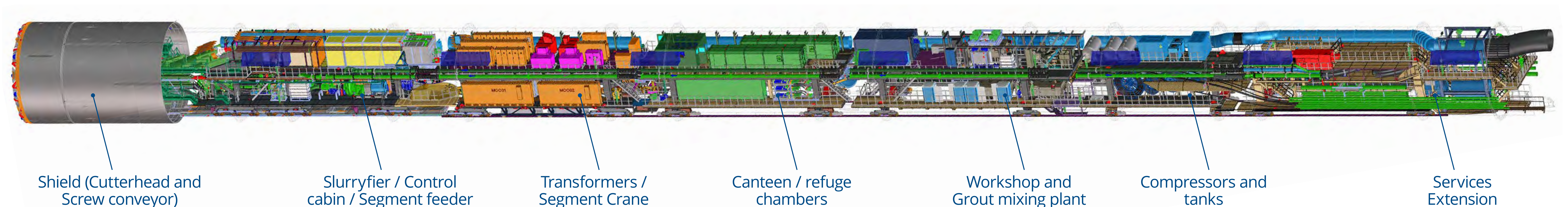
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# The Tunnel Boring Machine

The Tunnel Boring Machines (TBMs) designed to bore the Chiltern tunnel have been specifically designed to protect the ground water and chalk aquifers



## Boring the Chiltern tunnel

The first TBM is due to be launched from the South Portal, close to the M25 in early 2021, with the second machine, due to be launched a month later. These machines will dig the 10 mile long Chiltern tunnel at an average rate of 15.6 metres every day.

The TBMs weigh 2200 tonnes each, and will be 170 metres long.



Picture: The Tunnel Boring Machines are named Florence and Cecilia, as suggested by students at Meadow High School in Hillingdon and The Chalfonts Community College, Buckinghamshire

The TBMs maintain precise control of pressures at the cutting face as they bore through the ground. This helps to prevent slurry loss into the chalk and reduce ground water entering the excavation chamber during tunnel construction.

The spoil and slurry created whilst tunnelling will be transported back through the tunnel to the South Portal to be removed and treated.

## Segment assembly

Behind the TBM cutterhead and shield a machine called an erector installs precast concrete segments which form a ring.

This forms the final tunnel lining. Each of these rings is 2 metres long.

The TBM names honour women of science, astronomer Cecilia Payne-Gaposchkin and the founder of modern nursing Florence Nightingale.



# Tunnelling under Little Missenden

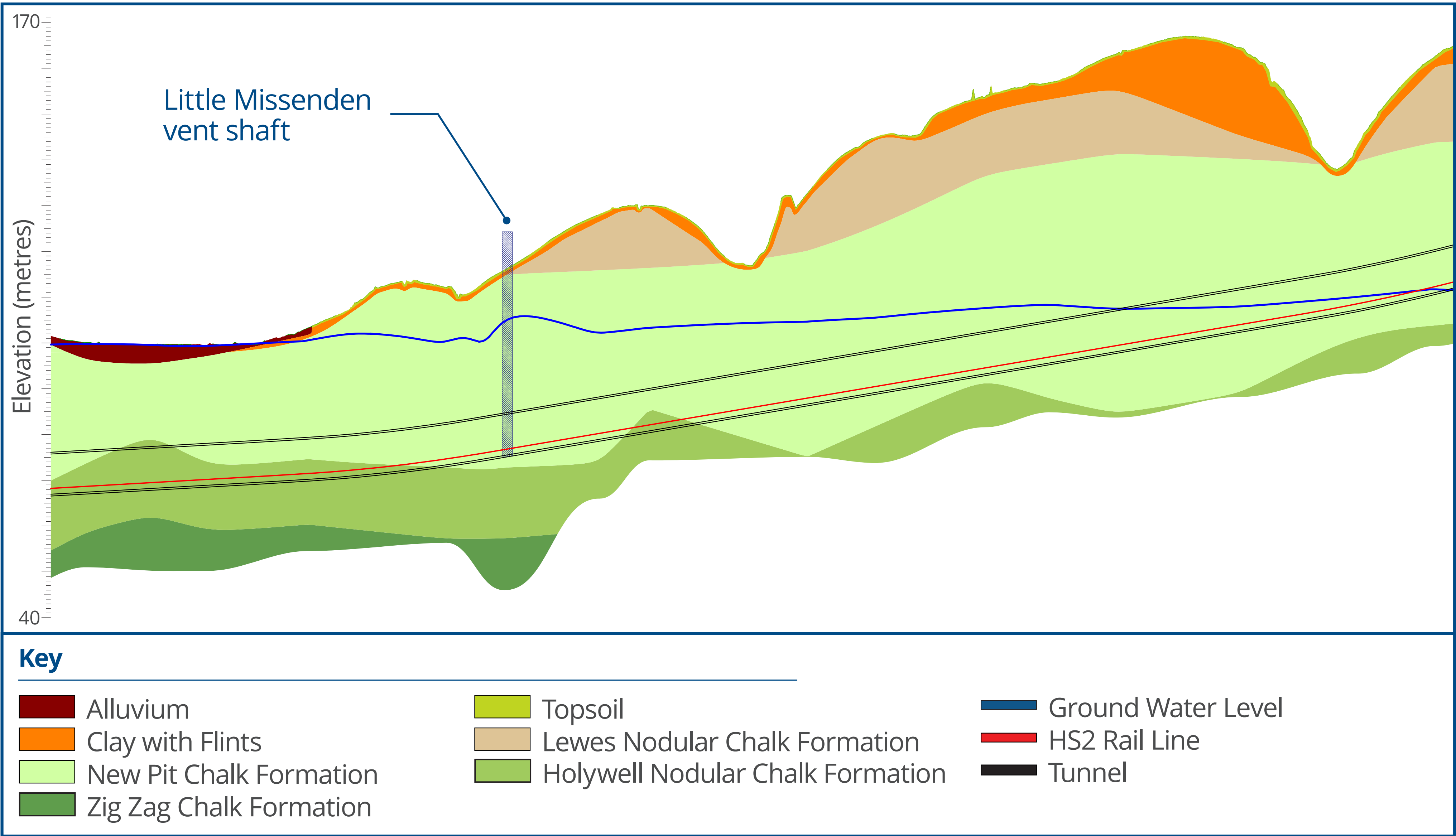
The Chiltern Tunnel will run from the South Portal at West Hyde, to the North Portal near South Heath, Great Missenden

The two bored tunnels (north and south) will be bored under a series of natural valleys in the Chilterns Area of Outstanding Natural Beauty.

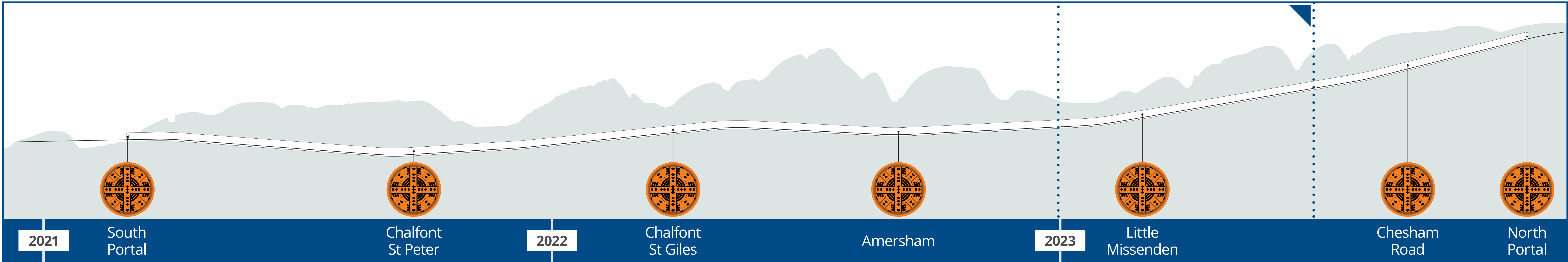
The majority of the tunnel will pass through chalk formations, punctuated by a series of faults.

Our extensive ground investigations have shown approximately 50 faults along the tunnel route, which is more than was first anticipated.

Our TBMs have been specially designed to manage the increased water volumes that can occur at these fault lines, preventing water ingress and protecting local ground water conditions.



## Indicative timetable for tunnelling



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# Our objectives

We think that the following objectives are important. Do you agree?  
Please let us know which of these issues is the most important to you, and any other comments that you have about our plans.

## Landscape

- Reflect the rural character of the site and surrounding landscape
- Find ways of reusing soil and materials excavated from the vent shaft
- Use existing trees, hedgerows and new planting to conceal structures as far as possible
- Replace lost trees and hedgerows which must be removed during construction
- Consider ways to enhance public experience in places where people get close to the site (for example, Keepers Lane)
- Consider the long term management and appearance of the site

## Ecology

- Keep as many existing trees and hedgerows as possible
- Restore the area using planting of native and indigenous species
- Create habitats that support as many species as possible (biodiverse)
- Create habitats that are typical of the area but rare and declining – for example chalk grassland
- Protect existing wildlife on the site during construction

## Design of the vent shaft headhouse

- Design structures that can be concealed or blend into the landscape
- Reduce visibility of buildings by lowering them where possible
- Maintain a familiar scale and form to local agricultural setting
- Keep the overall footprint (area) of the compound as small as possible
- Choose materials and detailing to help blend into the local landscape
- Reduce the operational impact of the proposed structure

## Construction

- Reduce noise and vibration on construction site
- Let people know when noisy works are occurring and keep residents updated with progress
- Return the wider construction site to how it was before construction started
- Minimise any visible impact of construction
- Reduce HGV movements on local roads
- Minimise carbon footprint, and reduce noise and air pollution across construction fleet



# Seeking your views

Which of our objectives are most important to you?  
What do you think of the design of the headhouse?  
What are your views on the landscape design?

## How to have your say

Please provide us with your feedback by Sunday 29 November 2020. It is important that we receive your comments by this date so that we can consider your feedback in the next stage of review for the vent shaft and headhouse design.

You can provide feedback in the ways listed below:

## Online survey

Visit [www.hs2inbucksandbox.co.uk](http://www.hs2inbucksandbox.co.uk) for a link to the survey

## Email

[hs2enquiries@hs2.org.uk](mailto:hs2enquiries@hs2.org.uk)

## Telephone

Call the HS2 Helpdesk on 08081 434 434.

## Information events

As part of our commitment to keeping you informed, we are holding exhibitions and events for local residents at each vent shaft.

Due to the Covid-19 pandemic we are not currently able to hold face-to-face public events, but we are holding several online meetings in September to share information about the design and construction of Little Missenden Vent Shaft. For more information and to find out how to join these meetings, please visit: [www.hs2inbucksandbox.org.uk](http://www.hs2inbucksandbox.org.uk)

## Next steps

We will consider the responses we receive and whether aspects of them can be incorporated into the final design.

1

## CONSIDER RESPONSES

We will consider the responses we receive and whether aspects of them can be incorporated into the final proposed design

2

## FEEDBACK REPORT

We will summarise the comments we received and confirm how they can inform the final design

3

## "YOU SAID, WE DID"

We will continue engagement with detailed information on the feedback that we received, and any changes made to the final design

4

## SUBMIT SCHEDULE 17

We will submit our request for approval of the Schedule 17 application, seeking approval for the final design

5

## CONSTRUCTION ENGAGEMENT

We will continue engagement with the local community to describe and discuss the construction impacts and the mitigation that we will put in place

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