Chalfont St Peter Vent Shaft Headhouse Schedule 17 Plans and Specifications: Design and Access Statement

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Chalfont St Peter Ventilation Shaft
Design & Access Statement

HS2

HS2 Ltd 1MC05-ALJ-TP-REP-CS02_CL04-000014 August 2020

Code 1 - Accepted

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1.0
Introduction

This section summarises the purpose and scope of the project and this Design and Access Statement, together with Schedule 17 requirements.

Executive Summary

1.1

1.1.1 Purpose

This Design and Access Statement has been prepared to support the submission of Schedule 17 requests for approval of plans and specifications of the Chalfont St Peter Ventilation Shaft and associated landscaping, to Buckinghamshire Council.

The Chalfont St Peter Vent Shaft is one of five shafts (4 ventilation shafts and 1 intervention shaft) along the line of the route of High Speed Two (HS2) Phase One where it runs through the Chiltern twin-tunnels. This Design and Access Statement explains the context of the site and justifies the rationale for the design of the scheme. The document supports the Written Statement and provides key visualisations of the Vent Shaft Headhouse and its associated landscape works.

This Design and Access Statement expands upon the design decisions made, the key opportunities and constraints affecting design, and the contextual elements of the site that the design has responded to.

1.1.2 Team

ALIGN JV are working on behalf of HS2 Ltd to design and construct the Chalfont St Peter Vent Shaft. They are a consortium of three companies which comprise:

- Bouygues Travaux Publics
- Sir Robert McAlpine
- VolkerFitzpatrick

Their combined experience, both in the UK and worldwide, in delivering high-profile infrastructure projects safely, on time and on budget, has established their reputation. Therefore, their alliance was formed to deliver the Chalfont St Peter Vent Shaft to the highest standards of excellence.

1.1.3 Document structure

This report has been subdivided into the following sections:

- **Context:** An appraisal of the physical, environmental, social and cultural features of the local context.
- **Brief:** Summary of briefing material, from HS2 design requirements and guidelines, hybrid Bill requirements, technical requirements and stakeholder aspirations.
- **Design vision:** Encapsulates the overall design vision through a series of key design objectives and visualisations.
- **Headhouse design:** Summary and justification of the Chalfont St Peter Ventilation Shaft design proposals relating to the headhouse and ancillary buildings.
- **Landscape design:** A summary of the indicative landscape design proposals with reference to the overarching landscape vision and design considerations, covering habitat creation and management, access and water management.
- **Sustainability:** Summary of how environmental, social and economic considerations have influenced the design proposals.
- **Engagement:** Summary of the various methods and results of engagement with local authorities, stakeholders, the local community and the HS2 Independent Design Panel undertaken to date.
- **Summary:** Summary of the Chalfont St Peter Vent Shaft and landscape design proposals alongside the feedback from the HS2 Independent Design Panel.

HS2 Project

1.2

1.2.1 Project overview

HS2 is a new high speed railway network that will connect major cities in Britain. It will bring significant benefits for inter-urban rail travellers through increased capacity and improved connectivity between London, the Midlands and the North. It will release capacity on the existing rail network and so provide opportunities to improve existing commuter, regional passenger and freight services, particularly on the West Coast Main Line (WCML).

1.2.2 Phase one

Phase One of HS2 will provide a dedicated high speed rail service between London, Birmingham and the West Midlands. Phase Two of HS2 will extend the railway to the north-west and north-east: to Manchester with connections to the WCML at Crewe and Golborne; and to Leeds with a connection to the East Coast Main Line approaching York.

1.2.3 Central section C1

Central Section C1 comprises 22km of the high-speed rail line, running between the Colne Valley and the Chilterns. It includes the 3.4km long Colne Valley Viaduct and its approach embankments, the Chiltern twin-tunnels and five shafts (4 ventilation shafts and one intervention shaft) and headhouses.

Key

- Proposed HS2 route
- Phase one central station section C1
- Colne Valley Viaduct and its approach embankments
- Chilterns Area of Outstanding Natural Beauty
- Colne Valley Regional Park
- Proposed HS2 stations
- Chiltern tunnel portal site
- Chiltern tunnel headhouse site

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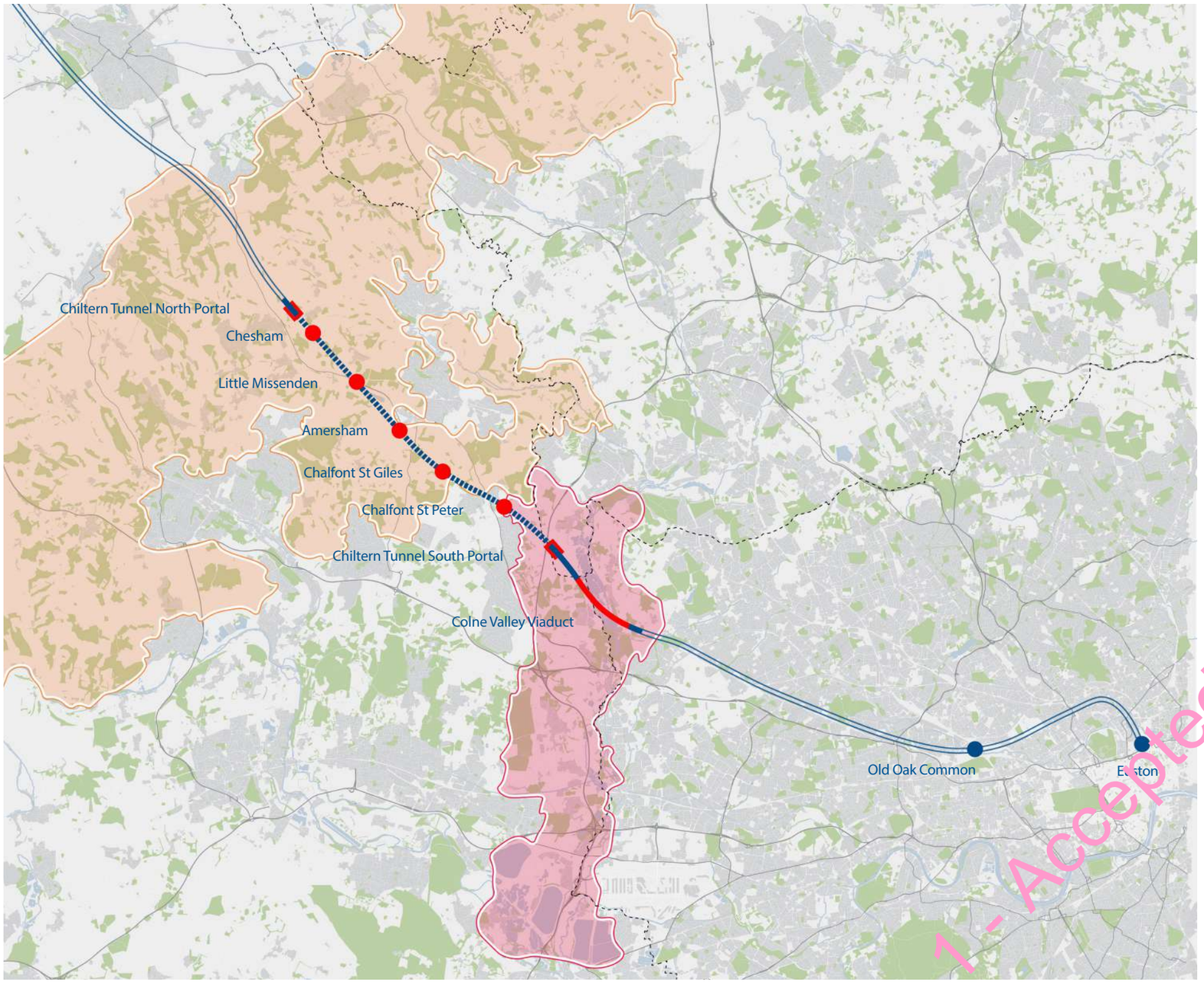

Fig.1.1_ Aerial map - Central section C1

1.2.4 Ventilation shaft location

The Chalfont St Peter Ventilation Shaft is located to the north of Chalfont St Peter in the county of Buckinghamshire. The schedule 17 request for approval for the ventilation shaft buildings, fencing location, landscape earthworks and other features is subject to the approval of Buckinghamshire Council. The Schedule 17 request for approval boundary is shown in Figure 1.2 and on the accompanying application drawing 1MC05-ALJ-TP-DSP-CS02_CL04-314201. Please refer to Section 2 of this report for further information relating to the existing context of the local area.

Fig.1.2_ Existing site plan - Schedule 17 application

1.2.5 Chalfont St Peter ventilation shaft

The Chalfont St Peter Vent Shaft is an important element within the new high-speed rail line which has been through rigorous engagement with the local council. ALIGN JV's approach has been to create a headhouse building and compound arrangement which is visually recessive within its rural context and responds positively to its landscape setting.

The design is informed by a thorough understanding of the landscape and environmental context, as well as rigorous technical criteria. The design proposals have also been developed alongside the key HS2 Design Principles of:

- Contextual approach
- Functionality, maintainability and flexibility
- Safety and security
- Value for money
- Buildability
- Sustainability

In developing our proposals, the landscape design seeks to respond positively to the character of the surrounding area. The design has followed the general approaches (as applicable) in the HS2 Landscape Design Vision which are to:

- Conserve
- Enhance
- Restore
- Transform

Engagement with the Chilterns AONB Review Group and the HS2 Independent Design Panel has been a crucial part of the design process. As the design has developed, proposals were shared with local planning authorities, statutory consultees, environmental groups and local communities at public engagement events. Feedback from this engagement process has influenced and steered the design submitted as part of this Schedule 17 request for approval.

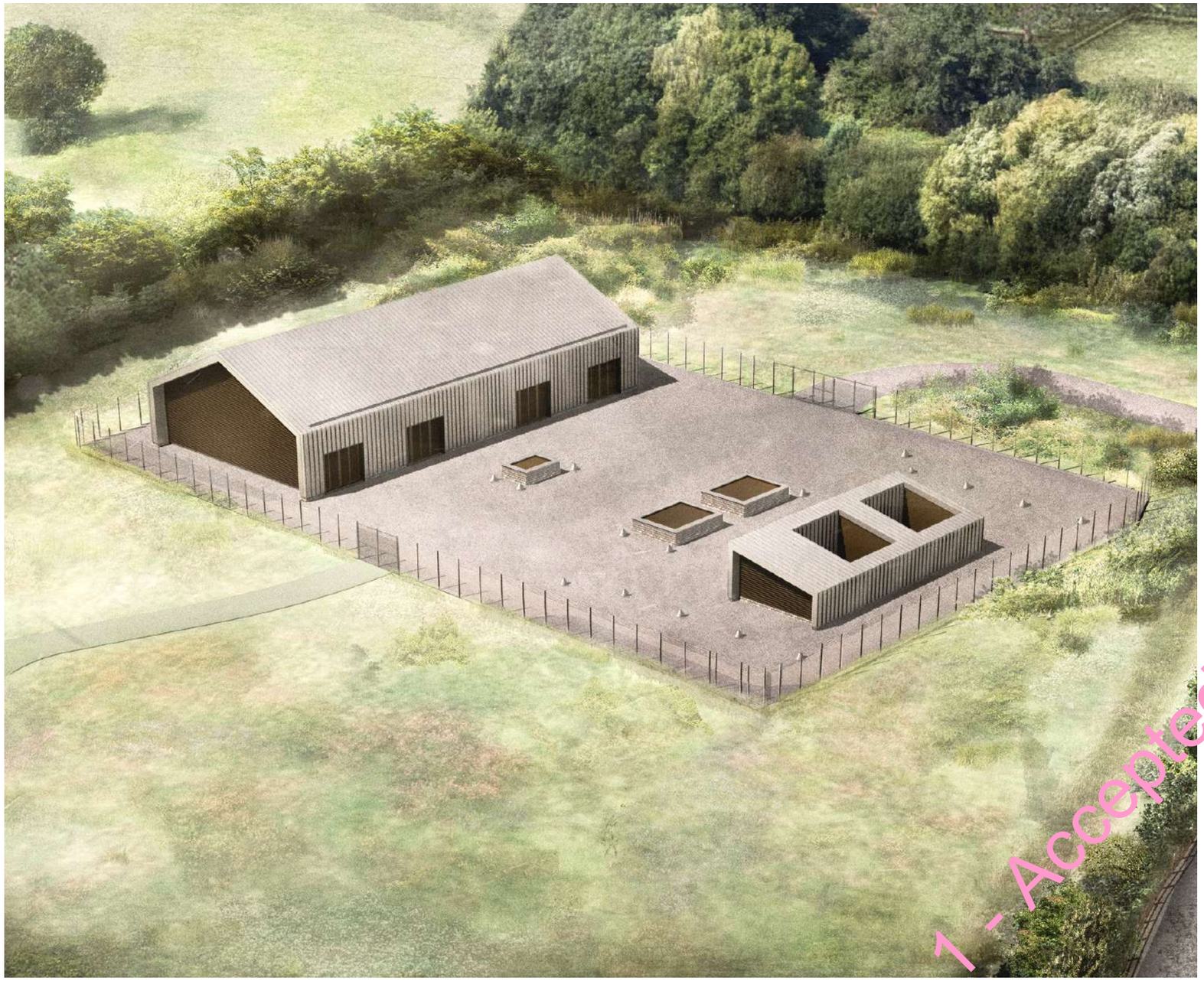

Fig.1.3_ Visualisation - Aerial view looking north north west

1.2.6 Key functional requirements

The primary functional requirements for Chalfont St Peter Ventilation Shaft are to:

- Provide a ventilation fan system to control the tunnel environment.
- Provide the necessary mechanical and electrical plant equipment to support the operation of the railway.
- Provide a dedicated and continuously available intervention access point for the emergency services to respond to an incident, such as a fire within the tunnels.
- Provide a route to the surface for drainage of the running tunnels.

The ventilation and intervention shafts and associated infrastructure will provide for:

- A minimum of 1,900 sq m hard-standing for maintenance and emergency access and egress from the tunnel.
- Headhouse structures sympathetically designed to its surroundings housing MEPH plant and equipment, maintenance access, stairs and a dedicated fire-fighter's lift.
- Construction and operational access.
- Permanent maintenance access roads to the headhouse compound and to the infiltration basin including drainage.

Other key operational requirements that have been considered include:

- Weekly testing of the fan operation.
- External lighting to illuminate the compound in the case of unwanted intrusion or in an emergency situation. External lighting will be over doors and controlled by PIR sensors. The compounds will not be constantly illuminated.
- Provision of maintenance access for regular servicing and inspection with more infrequent replacement of heavy mechanical and electrical equipment also required (approximately 20 year cycles).
- Security of the compound preventing intruders and errant vehicles from entering the headhouse site.

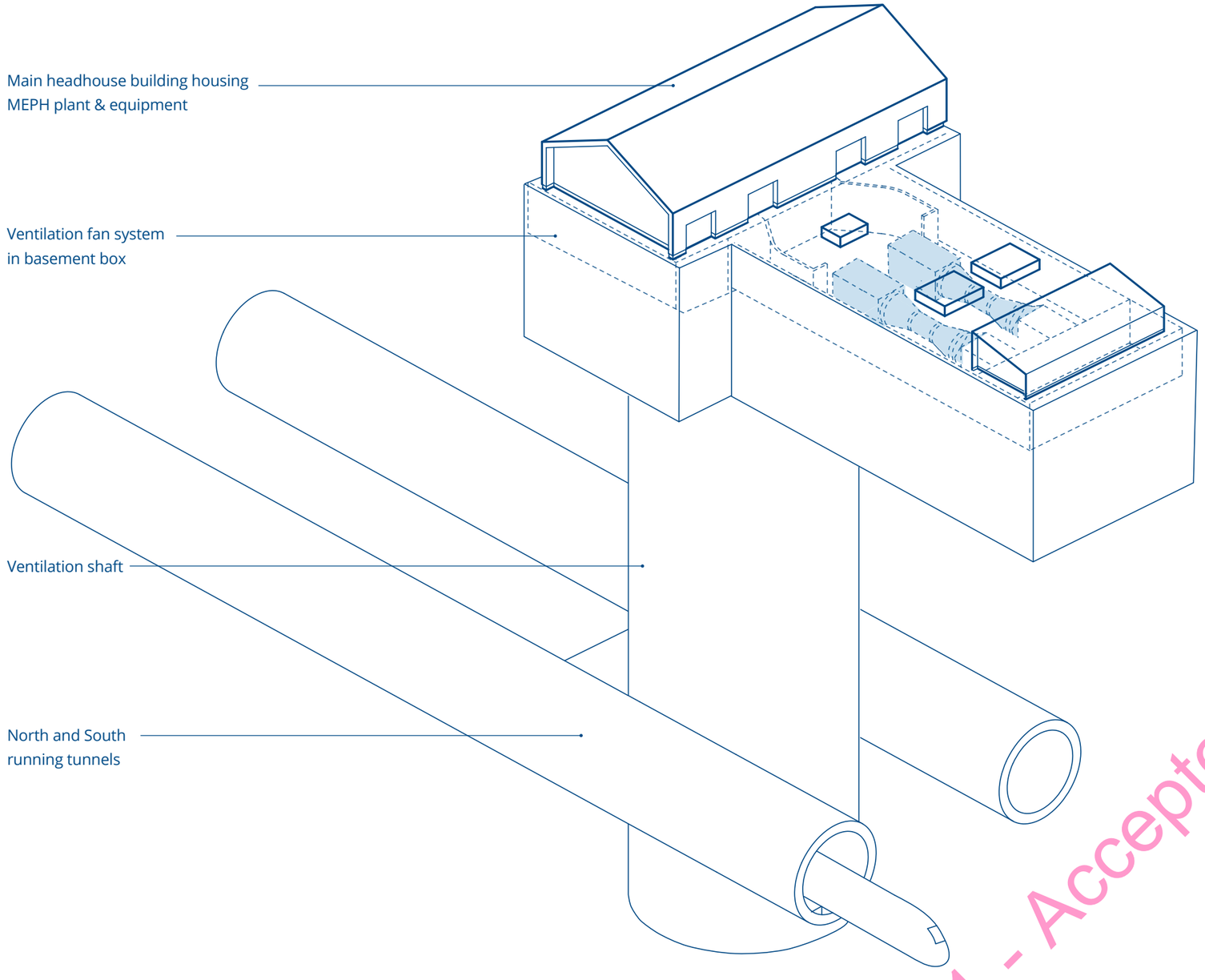

Fig.1.4_ Axonometric - Vent shaft and fans

1.2.7 Project development

The Chalfont St Peter Vent Shaft was granted deemed planning permission upon Royal Assent of the High Speed Rail (London - West Midlands) Act 2017 (referred to in this report as the HS2 Act) in February 2017. An initial preliminary design for the Chalfont St Peter Vent Shaft was prepared as part of the HS2 Act in order to define the location, together with broad design principles relating to the scale, massing and appearance.

Since that time, enabling works contractors and utility companies have been undertaking early works to prepare the line of the route for the main civil works required to construct the railway. Since the summer of 2017 Main Works Civil Contractors, including ALIGN JV, have developed the hybrid Bill design into a scheme design for Schedule 17 submission. The Chalfont St Peter Vent Shaft has now reached a level of design maturity whereby approvals can be sought.

Schedule 17 request for approval for the ventilation shaft headhouse is being sought for the expected construction start in 2020. Subject to obtaining Schedule 17 plans and specifications approval, preliminary construction of the ventilation shaft will take approximately 4-5 years.

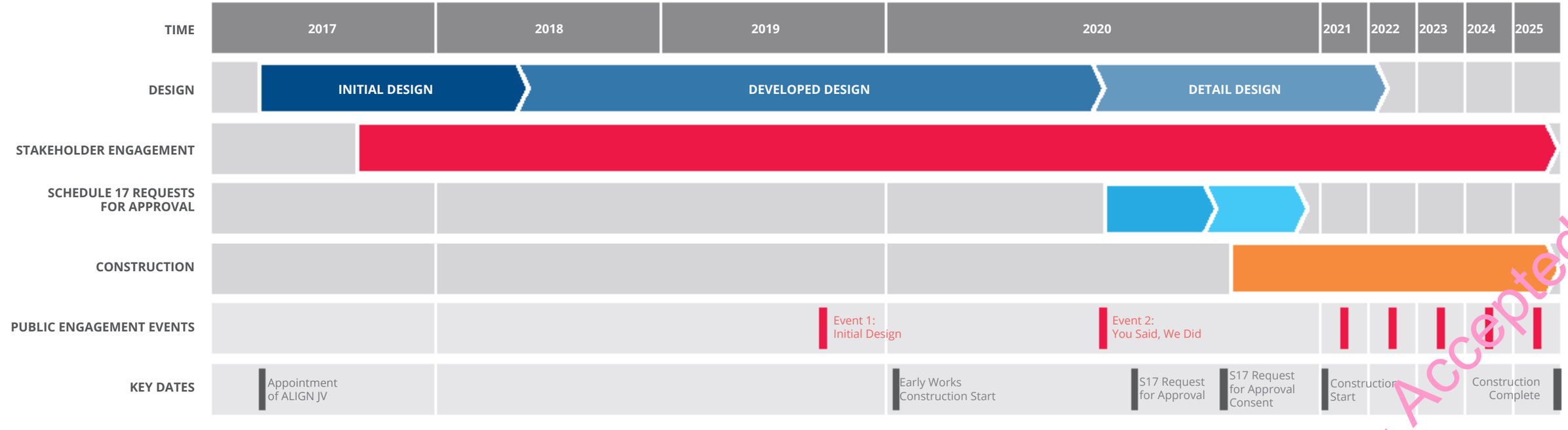

Fig.1.5_ Indicative project timeline

Schedule 17

1.3

1.3.1 Overview

The key documents, including Planning Forum Notes, that are relevant to this Design and Access Statement and Schedule 17 requests for approval are:

- High Speed Rail (London-West Midlands) Environmental Minimum Requirements Annex 2: Planning Memorandum, HS2 Ltd
- High Speed Rail (London - West Midlands) Act 2017: Schedule 17 statutory guidance, Department for Transport
- HS2 Phase One Planning Forum Note 1: Content of Submissions and Standard Templates, HS2 Ltd
- HS2 Phase One Planning Forum Note 2: Drawings for Plans and Specifications Approvals, HS2 Ltd
- HS2 Phase One Planning Forum Note 3: Written Statements and Design and Access Statements, HS2 Ltd
- HS2 Phase One Planning Forum Note 10: Indicative Mitigation, HS2 Ltd
- Planning Forum Note 16 (PFN16): Operational Noise from the Railway & Altered Roads

1.3.2 Schedule 17 documentation

The Schedule 17 request for approval of plans and specifications for the design and external appearance of the CSP Ventilation Shaft headhouse and ancillary structure and other matters is supported by other documentation that sit alongside this Design and Access Statement, including:

- Written Statement (1MC05-ALJ-TP-REP-CS02_CL04-000029): This document sets out the rationale and detail of the complete Schedule 17 submission, including indicative landscaping proposals. The document cross refers to this Design and Access Statement in several places.
- Restoration Proposals (1MC05-ALJ-TP-REP-CS02_CL04-000031): a document setting out the proposed restoration within the outer post and rail fence at the Chalfont St Peter Vent Shaft site
- Schedule 17 Noise Demonstration Report (1MC05-ALJ-EV-REP-CS02_CL04-000033) setting out the predicted noise effects of the Chalfont St Peter Vent Shaft site.
- Indicative Mitigation Consultation (1MC05-ALJ-TP-CRO-CS02_CL04-000026) consulting on the overall mitigation package at CSP. Note this is for the permanent design specifically and much of the mitigation at this site is subject to this present approval, or, has been previously applied for.
- Drawings: A series of plans, elevations, sections and visualisations showing the proposed Chalfont St Peter Vent Shaft buildings, landscape proposals, boundary features and ecological/drainage ponds.

References

1.4

1.4.1 Document list

This Design and Access Statement should be read in conjunction with the documents listed opposite, submitted as part of this Schedule 17 requests for approval. These documents also form a part of the concurrent consultation on Indicative Mitigation Details together with the site restoration submission for agreement, as set out in the document 1MC05-ALJ-TP-REP-CS02_CL04-000031.

For Approval under plans and specifications

- 1MC05-ALJ-TP-DSE-CS02_CL04-314301 - Chalfont St Peter Headhouse Proposed Headhouse Sections - Sheet 1
- 1MC05-ALJ-TP-DSE-CS02_CL04-314302 - Chalfont St Peter Headhouse Proposed Headhouse Sections - Sheet 2
- 1MC05-ALJ-TP-DPP-CS02_CL04-314401 - Chalfont St Peter Headhouse Proposed Headhouse Elevations - Sheet 1
- 1MC05-ALJ-TP-DPP-CS02_CL04-314402 - Chalfont St Peter Headhouse Proposed Headhouse Elevations - Sheet 2
- 1MC05-ALJ-TP-DPL-CS02_CL04-314203 - Chalfont St Peter Headhouse Proposed Site Plan
- 1MC05-ALJ-TP-DPL-CS02_CL04-314204 - Chalfont St Peter Headhouse Proposed Roof Plan
- 1MC05-ALJ-TP-DPL-CS02_CL04-314205 - Chalfont St Peter Headhouse Proposed Ground Floor Plan
- 1MC05-ALJ-TP-DSE-CS02_CL04-314121 - Chalfont St Peter Ventilation Shaft Landscape East/West Site Section (see legend for matters for approval)
- 1MC05-ALJ-TP-DGA-CS02_CL04-314120 - Chalfont St Peter Ventilation Shaft Landscape General Arrangement (see legend for matters for approval)
- 1MC05-ALJ-TP-DSE-CS02_CL04-314122 - Chalfont St Peter Ventilation Shaft Landscape North/South Site Section (see legend for matters for approval)
- 1MC05-ALJ-TP-DGA-CS02_CL04-314101 - Chalfont St Peter Headhouse View From Prow Looking North - Existing
- 1MC05-ALJ-TP-DPL-CS02_CL04-311202 - Chalfont St Peter Ventilation Shaft Access Road Junction Visibility Layout
- 1MC05-ALJ-TP-DEL-CS02_CL04-311401 - Chalfont St Peter Ventilation Shaft Access Road Longitudinal Profile

For agreement as part of Site Restoration

- 1MC05-ALJ-TP-DSE-CS02_CL04-314121 - Chalfont St Peter Ventilation Shaft Landscape East/West Site Section
- 1MC05-ALJ-TP-DGA-CS02_CL04-314120 - Chalfont St Peter Ventilation Shaft Landscape General Arrangement (see legend for matters for agreement under site restoration)
- 1MC05-ALJ-TP-DSE-CS02_CL04-314122 - Chalfont St Peter Ventilation Shaft Landscape North/South Site Section
- 1MC05-ALJ-TP-DPL-CS02_CL04-314123 - Chalfont St Peter Ventilation Shaft Landscape Planting Plan And Schedules
- 1MC05-ALJ-TP-DPL-CS02_CL04-314124 - Chalfont St Peter Ventilation Shaft Landscape Seeding Plan And Schedules
- 1MC05-ALJ-TP-REP-CS02_CL04-000031 Chalfont St Peter Restoration Proposals (Section 3 only)

Drawings Provided for information

- 1MC05-ALJ-TP-DSP-CS02_CL04-314201 - Chalfont St Peter Headhouse Location Plan
- 1MC05-ALJ-TP-DSP-CS02_CL04-314202 - Chalfont St Peter Headhouse Existing Site Plan
- 1MC05-ALJ-GI-MAP-CS02_CL04-000068 - Restoration status map

Documents provided for information

- 1MC05-ALJ-TP-REP-CS02_CL04-000014 - Chalfont St Peter Schedule 17 Design and Access Statement
- 1MC05-ALJ-TP-REP-CS02_CL04-000029 - Chalfont St Peter Schedule 17 Written Statement
- 1MC05-ALJ-TP-CRO-CS02_CL04-000011 - Chalfont St Peter Schedule 17 Covering Letter
- 1MC05-ALJ-TP-FRM-CS02_CL04-000006 - Chalfont St Peter Schedule 17 Proforma
- 1MC05-ALJ-TP-CRO-CS02_CL04-000025 - Chalfont St Peter Schedule 17 Restoration Covering Letter
- 1MC05-ALJ-TP-CRO-CS02_CL04-000026 - Chalfont St Peter Schedule 17 Indicative Mitigation Details
- 1MC05-ALJ-EV-REP-CS02_CL04-000033 - Chalfont St Peter Schedule 17 Noise demonstration Report
- 1MC05-ALJ-TP-REP-CS02_CL04-000031 - Chalfont St Peter Schedule 17 Restoration Proposals Report (section 1, 2, 4 and 5 and appendix 1 for information and context).

Illustrative Visualisations

1.5.1 Overview

Within this Design and Access Statement, a selection of computer generated visualisations of the Chalfont St Peter Vent Shaft have been included for illustrative purposes. Viewpoints have been selected to present key design features and the relationship of the Chalfont St Peter Vent Shaft with the surrounding site. Photography and imagery depict a range of different times of year and times of day to ensure the Chalfont St Peter Vent Shaft is presented as realistically as possible. The visuals are set in year 1 and year 15 of HS2 in operation.

Key

- Site
- Public Right of Way - Footpath CSP/10
- Existing buildings
- Compound
- 1, 2 PRoW to south of site looking north
- 3, 4 Chesham Lane looking west
- 5 Aerial view looking north north west

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Fig.1.6_ Site plan - Viewpoint locations

1.5.2 Viewpoint schedule

The viewpoint locations, time of year and time of day are listed and numbered below:

1. PRoW to south of site looking north - Pre-development - April / 8am
2. PRoW to south of site looking north - Year 1 - April / 8am
   (Chapter 4 pages 50-51)
3. PRoW to south of site looking north - Year 15 - April / 8am
   (Chapter 4 pages 52-53)
4. Chesham Lane looking west - Pre-development - October / 11am
5. Chesham Lane looking west - Year 1 - October / 11am
   (Chapter 4 pages 46-47)
6. Chesham Lane looking west - Year 15 - October / 11am
   (Chapter 4 pages 48-49)
7. Aerial view looking north north west - Year 15
   (Chapter 4 pages 44-45)

1 Fig.1.7_ Photograph - View from PRoW to south of site looking north - Pre-development - April / 8am

4 Fig.1.8_ Photograph - View from Chesham Lane looking west - Pre-development - October / 11am

Acronyms

1.6

1.6.1 Acronyms

- CSP - Chalfont St Peter
- DAS - Design and Access Statement
- EA - Environment Agency
- EMR - Environmental Minimum Requirements
- ES - Environmental Statement
- HS2 - High Speed Two (the project)
- HS2 Ltd - High Speed Two Ltd (the nominated undertaker)
- HS2 IDP - HS2 Independent Design Panel
- LLAU - Limits of Land to be Acquired or Used
- LOD - Limits of Deviation
- LPA - Local Planning Authority
- MWCC - Main Works Civils Contract
- SSSI - Site of Special Scientific Interest
- WFD - Water Framework Directives
- PRoW - Public Right of Way
- LCA - Landscape Character Area

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2.0
Context

An appraisal of the physical, environmental, recreational, social and cultural features of Chalfont St Peter.

Regional Context

2.1.1 Overview

The site is situated within a predominantly rural context defined by the distinctive rolling landscape of the Chiltern Hills and locally by the Misbourne river valley. It lies approximately 750m to the south of the Chilterns Area of Outstanding Natural Beauty (AONB) and is in close proximity to a number of the locally important settlements including Chalfont St Giles, to the north-west and Chalfont St Peter to the immediate south.

The A413 Amersham Road lies to the west, within the valley floor, whilst local roads connect neighbouring residential and employment areas; one of these, Chesham Lane, follows the eastern boundary of the site. A network of public rights of way extend across the area and includes a route along the southern boundary of the site.

The are a small number of archaeolgocial and historic features recorded within the immediate surrounds of the site and include the ancient and semi-natural broadleaf woodland at Turners Wood and features associated with Ashwell Farm located to the immediate north.

The site lies within the Buckinghamshire County administrative area (formally part of Chilterns District) and is situated within the Green Belt.

2.1.2 Chilterns AONB

The Chilterns AONB forms the contextual setting for the Chalfont St Peter ventilation shaft and is a key consideration which has informed the design approach and narrative for the site.

The Chilterns AONB is a nationally protected landscape and represents one of the most important and finest landscapes in the UK. The single purpose of AONB designation is 'to conserve and enhance the natural beauty of the area'.

Its distinctive qualities and characteristics are informed by a mosaic of ancient woodland, chalk streams, farmland, chalk downland and features of cultural and historic importance, shaped by natural processes and generations of human activity. Many of the features which define the Special Qualities of the AONB are evident within the site and its immediate setting and include but are not limited to:

- Panoramic views;
- River valleys;
- Woodland cover including Ancient Woodland;
- Relative tranquillity; and
- Regional footpaths and routes including the Chilterns Way

2.1.3 Landscape character

The site and its immediate environs extend across two landscape character areas (LCA) - the Misbourne Lower Settled River Valley LCA and the Chalfont St Peter Mixed Use Terrace LCA.

The landform comprises a broadly north-south orientated valley of the river Misbourne with the narrow flat flood plain giving way to valley slopes cut into the Upper Chalk formation. The valley topography results in a relatively enclosed character which can appear small scale.

The eastern slopes which connect the two LCAs comprise horse paddocks bounded by post and rail and post and wire fences. The paddocks are enclosed to north and south by the more urban areas of Chalfont St Peter and Chalfont St Giles.

The medium to small scale field pattern is still discernible although hedgerows are frequently puntuated by scattered shrubs and trees and where continuous are either overgrown or cut low. Roadside hedgerows are largely intact and continuous.

Mature woodland and trees are an important feature of the landscape and typically are associated with settlements and roads. These therefore provide a buffer and seperation between the urban and rural particularly on the eastern slope. Throughout the character areas small woodlands, tree groups and individual trees break up and filter views.

The river Misbourne is largely hidden and unseen except within the more urban areas, although intermittent hedgerow and dispersed trees along its length indicate its location within the pasture fields of the valley floor in this location. Built up areas at the centre of Chalfont St Giles enclose the northern part of the Misbourne Lower Settled River Valley LCA where the river Misbourne runs through the centre of the village close to the Church of St Giles.

On the valley slopes and elevated landform where overlaying, free draining soils persist, there are no significant water bodies.

There are long views afforded from a number of locations within the valley often from the A413, Amersham Road as well as from the many public footpaths.

The following landscape cues are shown on the photos overleaf.

1. The existing A413 transport corridor has a strong influence on the character and will reduce susceptibility to the access road.
2. Loss of trees to the A413, Amersham Road, has the potential to open up views of traffic on the A413 and on the access road and will increase susceptibility to the access road.
3. Attractive rural views from the elevated locations, having few detracting elements will be susceptible to disruption by the access road and moving traffic.
4. Mature trees are found along the A413, Amersham Road, and on the edge of housing.
5. The Landform comprises a river valley.
6. Overlaying the slopes are irregular pasture fields and paddocks bounded by a patchy network of hedgerows, fences and tree groups.
7. The A413, Amersham Road, is a major transport route and prominent feature along the valley floor.
8. Pasture slopes ascend east and west to wooded ridgelines and afford panoramic views across and along the valley towards the villages of Chalfont St Peter and Chalfont St Giles.
9. Views towards the Chilterns AONB over rolling wooded landform are panoramic from elevated locations.
10. There are few detracting features visible within the landscape or on the skyline.
11. Continuous hedgerows, although present in some locations, have been lost along many boundaries and the field pattern has been degraded as a result.

2.1

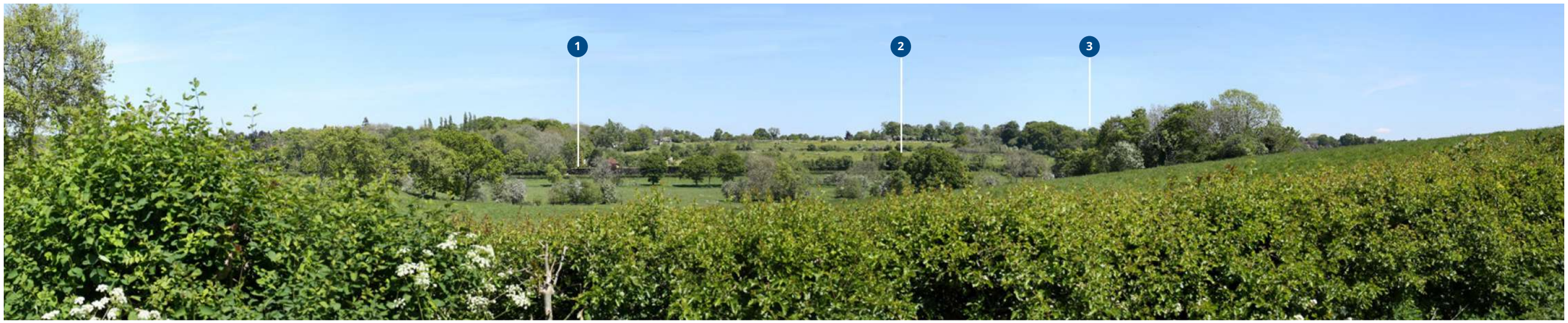

Fig.2.1_ Photograph - View north east from Footpath CSG/3/1 and residences on Bowstridge Lane

Fig.2.2_ Photograph - View north east from Footpath CSG/3/1

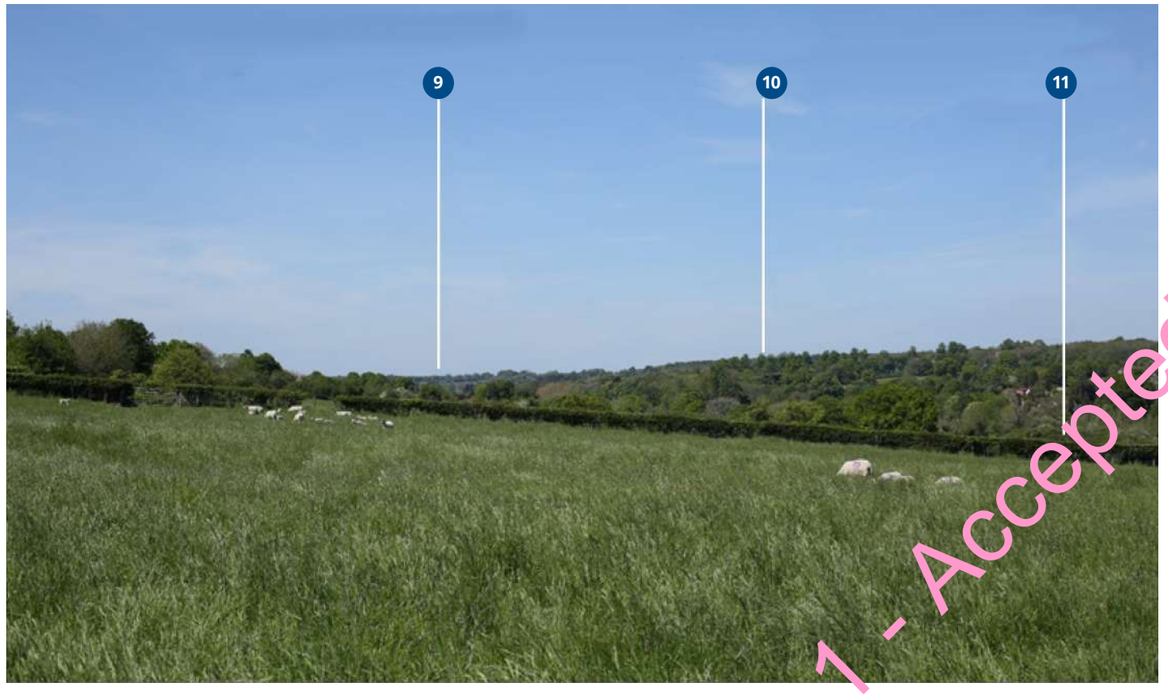

Fig.2.3_ Photograph - View north from Footpath CSG/3/1

Local Context

2.2.1 Location

Chalfont St Peter is the first shaft along the Chiltern tunnel. This ventilation and intervention only shaft is to be located in an agricultural field at approximately 50m from Chesham Lane, to the south of Ashwell's Farm and to the north of Turner's Wood Farm.

The site is situated on locally elevated land at approximately 100m AOD. Land falls very gently from east to west across the site although the perception is that the landform is predominantly flat. The site comprises pastoral farm land and is contained by existing mature tree belts and hedgerows providing well-defined boundaries on three sides, whilst along the Chesham Lane frontage there is an established field hedgerow.

A public right of way follows the southern site boundary (albeit outside of land within HS2 control). Chesham Lane is approximately 50m east of the site. The site is between Chalfont Common and Chalfont St Giles and approximately 500m from the A413. There are no landscape designations covering this site, albeit the Chilterns AONB lies approximately 750m to the north on higher ground.

2.2.2 Ecology

The site currently contains a works compound, which has largely replaced the grassland field described below with hard-standing and compound buildings. The boundary features are largely intact although a section of the eastern hedgerow was removed to allow access to the compound and a small number of trees have been removed to allow bunding of the compound.

The habitats present within the site prior to development of the compound included the following:

- Poor semi-improved grassland: the field in which the shaft site is contained.
- Intact hedge - species-poor: the hedgerow along the eastern boundary.
- Broadleaved woodland - semi-natural: a thin strip of mature trees along the northern boundary of the field.
- Hedge with trees - species-poor: the western and southern field boundaries

Immediately to the north-west of the site, there is the completed Early Works Contractor's habitat creation scheme comprising newt ponds and grassland and hegerow reinstatement.

2.2.3 Environmental constraints

The compound is set within largely open countryside, with the settlement of Chalfont St Giles located approximately 200metres to the north-west. It was identified early in the design process that the landscape strategy should prioritise the integration of the head house and supporting infrastructure into the overall landscape setting.

Two public right of ways Footpath (CSG/32) are located within close proximity of the proposed compound. The landscape design will fully consider these and the surrounding settlements, ensuring existing hedgerows and field boundaries are protected and 'gaped-up' where practicable to manage views of the site.

The site is within an area assessed as being Grade 3a Agricultural Land (Agricultural Land Classification). It has a versatile well to moderately drained loamy topsoil over clay. There are agricultural and forestry holdings to the north and west.

In addition to the settlement of Chalfont St Giles, a number of isolated farm properties are located nearby. The most notable of these are Cricket Field Cottage, Ashwell's Farm and Turners Wood Farm. Therefore, the introduction of sources of noise and lighting will have an impact on the local vicinity of the area and the sporadic residential properties in the location. The ES concluded that there would be no significant effects for noise and vibration and therefore works must be planned to ensure this can be achieved.

2.2.4 Geology

The site lies over up to 6 m of Superficial deposits (predominantly Clay-with-Flints, but may contain Beaconsfield Gravel deposits). Beneath this there is approximately 5m of Completely weathered Grade D structureless chalk (chalk silt and gravel), with 'Significantly weathered chalk' and then 'Competent chalk' beneath that.

2.2.5 Archaeology

Due to previous discoveries within this zone suggesting the potential for remains from the Mesolithic to the Romano-British periods, possibly presenting as unstratified artefacts within the plough soil, evaluation was proposed in this area.

Works undertaken at Chalfont St Peter Vent Shaft included trial trenching undertaken on land to the west and south of Ashwell's Farm. The land was required for reptile habitat creation including a mitigation pond and grassland habitat covering an area of c.2.45ha. Seven archaeological trial trenches were excavated during 20 June 2018 to 27 June 2018, revealing no archaeological remains and no further works were recommended. Topsoil sieving for artefact collection across the site recovered a small number of modern finds.

A fluxgate gradiometer survey (AC100-2) of an 0.69ha area immediately south of the vent shaft site detected no anomalies of probable or possible archaeological origin. The geophysical results primarily reflected ferrous responses associated with the current land use as horse paddocks, natural processes within the soils and geology and agricultural activity.

Archaeological monitoring was also undertaken at the Chalfont St Peter Vent Shaft Temporary Access road. The site was located to the south and southwest of the Chalfont St Peter Vent Shaft site, between the Vent Shaft worksite and the A413.

A total of13 geotechnical test pits were also monitored by an archaeologist over the course of investigation. The stratigraphic sequence observed consisted of topsoil straight onto natural river terrace gravels. In the south of the study area there was chalk underlying the gravels. No archaeological features were observed in any of the test pits, although the topsoil sieving did produce a very small assemblage typical of rural locations, but was too small to reach any conclusions.

2.2

Key

- Site
- Public Right of Way
- Building
- Road
- Grass
- Garden
- Woodland
- Ancient woodland - replanted
- Ancient woodland - semi-natural
- Chilterns Area of Outstanding Natural Beauty

0 100 250 M

N

Fig.2.4_ Site plan - Environmental and landscape context

Local Context

2.2.6 Pre-development site photography

A Fig.2.6_ Photograph - View looking south along Chesham Lane towards the site

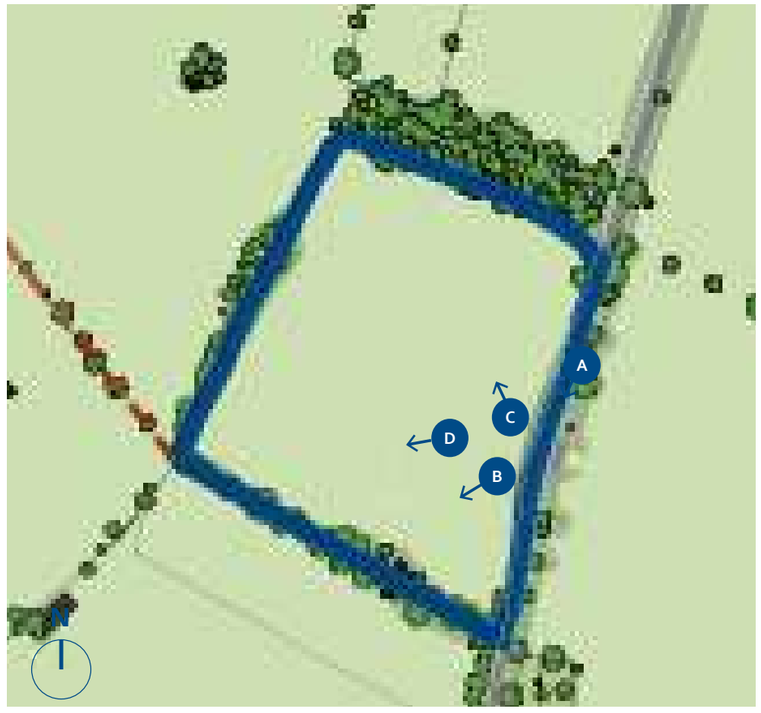

Fig.2.5_ Key plan

D Fig.2.7_ Photograph - Panoramic view of the shaft site from looking west from Chesham Lane over farm gate / gap in hedgerow

2.2

B Fig.2.8_ Photograph - View south of site over farm gate

C Fig.2.9_ Photograph - View north of site over farm gate

Local Context

2.2.7 Built environment - Heritage buildings

There are a considerable number of historic buildings in proximity the vent shaft site. The most prominent and closest are noted in this section.

The Ashwell's Farmhouse grouping (CHA017) is located to the north of the Chalfont St Peter ventilation shaft with Ashwell's Barn located within the 10 mm settlement contour for the proposed works. Ashwell's Farm has potential medieval origins as rental documentation for the area from 1333 indicates that John de Asschewell was living at a site known as 'Ashwells'. The present Grade II Listed farm house has post-medieval origins, probably dating to the early 17th century. It is a two-storey timber-framed house with brick infill to the framing. There are a number of the small former farm buildings surrounding the farmhouse have been converted for domestic use.

Ashwell's Barn is a large 17th to 18th century timber-framed structure located within the asset grouping of Ashwell's Farm. The weatherboarded barn has a queen strut roof truss, was previously part of the farm buildings of Ashwell's Farm and has now been converted into a separate residential dwelling. The barn is set upon a brick plinth and has an old tile roof.

Ashwell's Farm is situated at the end of an avenue to Newlands House and Park. The current house at Newlands Park dates to 1770. The site, however, is known to date from at least 1208. Ashwell's Farm may have had an association with Newlands House and Park and there would have been inter-visibility between the farm and the house at Newlands.

To the northwest of the Chalfont St Peter ventilation shaft is Chalfont St Giles Conservation Area (CHA019), a village located at the bottom of the Misbourne Valley with the river meander along the eastern boundary of the settlement acting as a clear demarcation between the urban area and the adjoining open meadowland. The northern section of the conservation area is located within the 10mm settlement contour of the Chiltern Tunnel. The Chalfont St Giles Conservation Area encompasses the old core of the village and includes 33 listed buildings. The village green forms the centrepiece of the area enclosed by a compact pattern of buildings. The Conservation Area includes high value buildings such as the Grade I listed Church of St Giles which has 13th century origins although much was restored during the late 19th century, entirely surrounded by the associated churchyard. Other prominent buildings include the Grade I listed Milton's Cottage and the Grade I listed Church of St Giles and the Grade II* listed 17th century Rectory, located within the centre of the village close to the village green.

Fig.2.10_ Site plan - Heritage buildings

A Fig.2.11_ Photograph - Chalfont St Peter Parish Church

B Fig.2.12_ Photograph - Ashwells Barn, Chesham Lane

C Fig.2.13_ Photograph - Greene House, Chalfont St Peter

Close proximity buildings

D Fig.2.14_ Photograph - Cricket Field Cottage, Chesham Lane

E Fig.2.15_ Photograph - Chiltern Open Air Museum - Skippings Barn

F Fig.2.16_ Photograph - Residential properties, Valentine Way, Chalfont St Giles

Local Context

2.2.8 Built environment

The character of the local historic and current agricultural/industrial buildings follow consistent material and structural principles. The key features of which include a simple gabled form, timber cladding and brick plinth base,

Located at the Chiltern Open Air Museum, a grouping of historical Industrial/agricultural buildings offer precedent to the historical architectural character of the surrounding context. The Chiltern Open Air Museum is located 1.1km from the Chalfont St Peter ventilation shaft and contains multiple precedent buildings, many of which have origins in the 16th and 17th century.

Examples of which include the Skippings barn. Originally located on the Skippings Farm, Chalfont St Peter, Buckinghamshire (part of the Newland Park estate), the barn is believed to date from the 18th century and is a good example of the traditional 'Chilterns barn' typology. Probably originally used as a stable the oak framed structure of the barn divides the barn into three spaces with a pair of doors positioned centrally. Other historic precedent industrial/agricultural buildings present at the Chiltern Open Air Museum include the formally grade II listed Northolt barn and the Didcot Cartshed. Both buildings follow similar structural principles demonstrated in the Skippings barn.

Modern precedents include a cluster of industrial/agricultural buildings present on the Lower Bottom House Farm, located 2.9km from the Chalfont St Peter ventilation shaft. Although updated slightly the strong material and structural principles exhibited in the historical precedents still apply with horizontal timber cladding, gable roof, and brick plinth defining the architecture.

Fig.2.17_ Site plan - Industrial agricultural buildings

2.2

A Fig.2.18_ Photograph - Skippings barn

B Fig.2.20_ Photograph - Didcot cart shed

C Fig.2.19_ Photograph - Chalfont St Giles

D Fig.2.21_ Photograph - Lower bottom house barn

E Fig.2.22_ Photograph - Lower bottom house barn

F Fig.2.23_ Photograph - Bottom house barn

Social and Cultural Context

2.3.1 Historical

The Chalfonts and Amersham area lies on the dip-slope of the Chilterns, an area of chalk plateau land, dissected by valleys, such as the River Misbourne, draining eastward to the River Colne and on to the River Thames.

The Chiltern dip-slope has seen human activity throughout the Mesolithic period (circa 10,000 BC – circa 4,000 BC), the Neolithic and the Bronze Age, when human activity was largely concentrated in the principal valley systems specifically within the Misbourne Valley.

The area is predominantly rural and agricultural with the settlement characterised by farmsteads and small hamlets adjacent to the principal valleys set within a heavily wooded landscape, much of it ancient beechwood.

Around Chalfont St Peter are extensive, coaxial field systems and irregular fields of medieval and post-medieval date with small isolated pockets of highly degraded ridge and furrow earthworks, indicative of medieval open agriculture, identified to the south of Ashwell's Farm.

The broad pattern of landscape and settlement which exists in the area today was primarily laid out during the medieval and early medieval periods. Dispersed settlements and isolated farmsteads surrounded by an agricultural hinterland predominated, with scattered manors in the surrounding countryside. The landscape was likely to have been at least partially wooded. The exception to this characterisation is the medieval planned town of Amersham. This pattern of medieval settlement most probably continued through the post-medieval (AD 1540 – AD 1900) period as evidenced by extant post-medieval dwellings in the core of the three settlements of Chalfont St Peter, Chalfont St Giles and Amersham.

Chesham Lane, which may have medieval or post-medieval origins but has been widened to accommodate modern traffic, bisects the area. Whilst the area west of Chesham Lane is characterised by pre 18th century irregular enclosures with isolated farmsteads such as Ashwell's Farm, the area to the east of Chesham Lane is characterised by 20th century enclosure with recreation areas to the south.

During the modern period (1900 - present) this pattern of landscape and settlement is likely to have remained unaltered until the expansion of the London suburbs aided by the building of the railways in the late 19th and early 20th centuries. The growth of the settlements of Chalfont St Peter and Amersham was further increased by the establishment of the 'Metrolands' during the mid-20th century. The Metroland suburbs were designed as an escape from the capital to an idyllic 'countryside' lifestyle, yet crucially connected to the city by rail.

Fig.2.24_ Aerial photograph - 1921 Austenwood Lane and Packhorse Road

Fig.2.25_ Aerial photograph - A413 in 1938

Fig.2.26_ Aerial photograph - Tunmers in 1949

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2.3

3.0
Brief

A summary of briefing material, from HS2 design vision and guidelines, hybrid Bill requirements, technical requirements and stakeholder aspirations.

HS2 Design Drivers

3.1.1 HS2 core design principles

The Design Vision sets out the role that design can play in making High Speed Two a catalyst for growth across Britain. HS2 is based on three core design principles of people, place and time. These have informed the design process for the Chalfont St Peter Ventilation Shaft (Chalfont St Peter Vent Shaft) at every stage and provide a basis against which design solutions have been tested.

People

Design for everyone to benefit and enjoy

1. Design for the needs of our diverse audiences
2. Engage with communities over the life of the project
3. Inspire excellence through creative talent

Place

Design for a sense of place

4. Design places and spaces that support quality of life
5. Celebrate the local within a coherent national narrative
6. Demonstrate commitment to the natural world

Time

Design to stand the test of time

7. Design to adapt for future generations
8. Place a premium on the personal time of customers
9. Make the most of the time to design

Fig.3.1_ HS2 core design principles - People, place and time

3.1.2 Other key design principles

Other key aspects of the HS2 Design Vision that have influenced the design of the Chalfont St Peter Vent Shaft are;

Identity

The HS2 Arts Strategy is an opportunity to foster HS2's vision to enhance national and civic pride through one-off expression and local design stories.

Environment

The HS2 Sustainability Strategy promotes an environmental rationale to deliver imaginative, appropriate and environmentally sensitive solutions.

Innovation

HS2 Ltd has brokered partnerships with industry bodies and centres of excellence, to create an ecosystem of resources to encourage and support innovation across the programme of work.

3.1.3 HS2 strategic goals

From an early stage of the project, core strategic goals were established as key outcomes for the new high speed line. These goals have guided the design approach to the Chalfont St Peter Vent Shaft, with the following acting as key drivers for the design;

HS2 will create an environmentally sustainable solution and be a good neighbour to local communities:

- To design every part of HS2 and its service to be sympathetic to the people and places we affect and to stand the test of time
- To actively communicate with neighbours and interest groups to minimise the impact of HS2 construction and operation on people and the environment

HS2 will set new standards in passenger experience

- To deliver passenger experience and customer service that is recognised worldwide
- To place people at the heart of our design, setting new standards for travel

3.1.4 HS2 sustainability goals

Sustainability is an important component to making HS2 an exemplar project. Therefore designing out and reducing waste, minimising our carbon footprint and protecting Britain's heritage shall be key drivers for the Chalfont St Peter Vent Shaft. The HS2 sustainability goals are set out in Fig. 3.3.

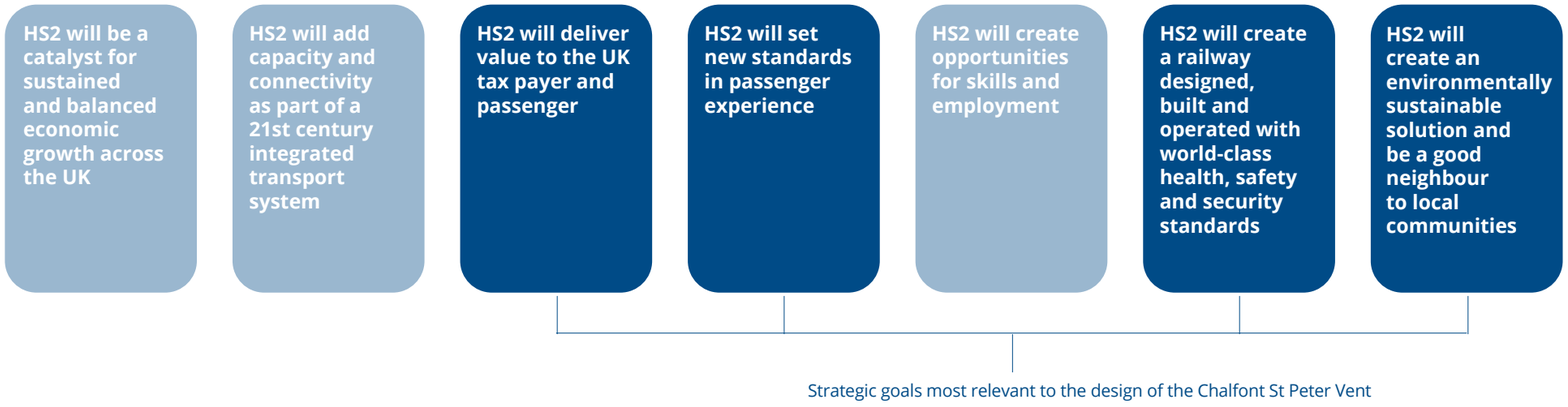

Fig.3.2_ HS2 strategic goals

Spreading the benefits

Economic growth and community regeneration

Being a catalyst for regeneration and economic growth across the UK, maximising the benefits to communities and individuals and minimising the negative impacts

Opportunities for all

Skills, employment and education

Providing rewarding jobs and careers that are open to all in society, setting new standards for equality, diversity and inclusion and providing a legacy of skills, learning, expertise and experience

Safe at heart

Health, safety and well-being

Creating a world-class 'safe at heart' culture where no one gets hurt, and which prioritises the health and well-being of those who build, operate, use and host HS2 services and infrastructure

Respecting our surroundings

Environmental protection and management

Being a catalyst for breaking new ground wherever possible on environmental standards including resource use, waste, carbon minimisation, the protection of the natural and historic environment and safeguarding communities.

Standing the test of time

Design that is future-proof

Designing a network that is resilient to climate change, adaptable to future trends and demands and built around the needs of the people who will use it

Fig.3.3_ HS2 sustainability goals

HS2 Act

3.2.1 Location

The purpose of the hybrid Bill is to secure the necessary powers to acquire land and construct the railway and other associated works.

The parliamentary plans and sections accompanying the HS2 Act show the centerline of works, the Limits of Deviation (LOD) and the Limits of Land Acquired or Used (LLAU). It is a requirement of hybrid Bills that some flexibility is provided to account for the fact that at the Parliamentary stage, the design is at an early level of maturity.

The LOD control the horizontal and vertical extents that the Scheduled Works contained in Schedule 1 of the HS2 Act can be constructed within. The Chalfont St Peter Vent Shaft and its associated embankments and abutments form a part of Schedule Work number 2/1 as described in Schedule 1 to the HS2 Act. The centerline of the railway may also deviate vertically upwards by up to 3 metres and downward by any extent.

Within the LLAU, ancillary works and other works incidental to the construction or operation of the railway, such as environmental mitigation, access creation, temporary construction compounds, may also take place.

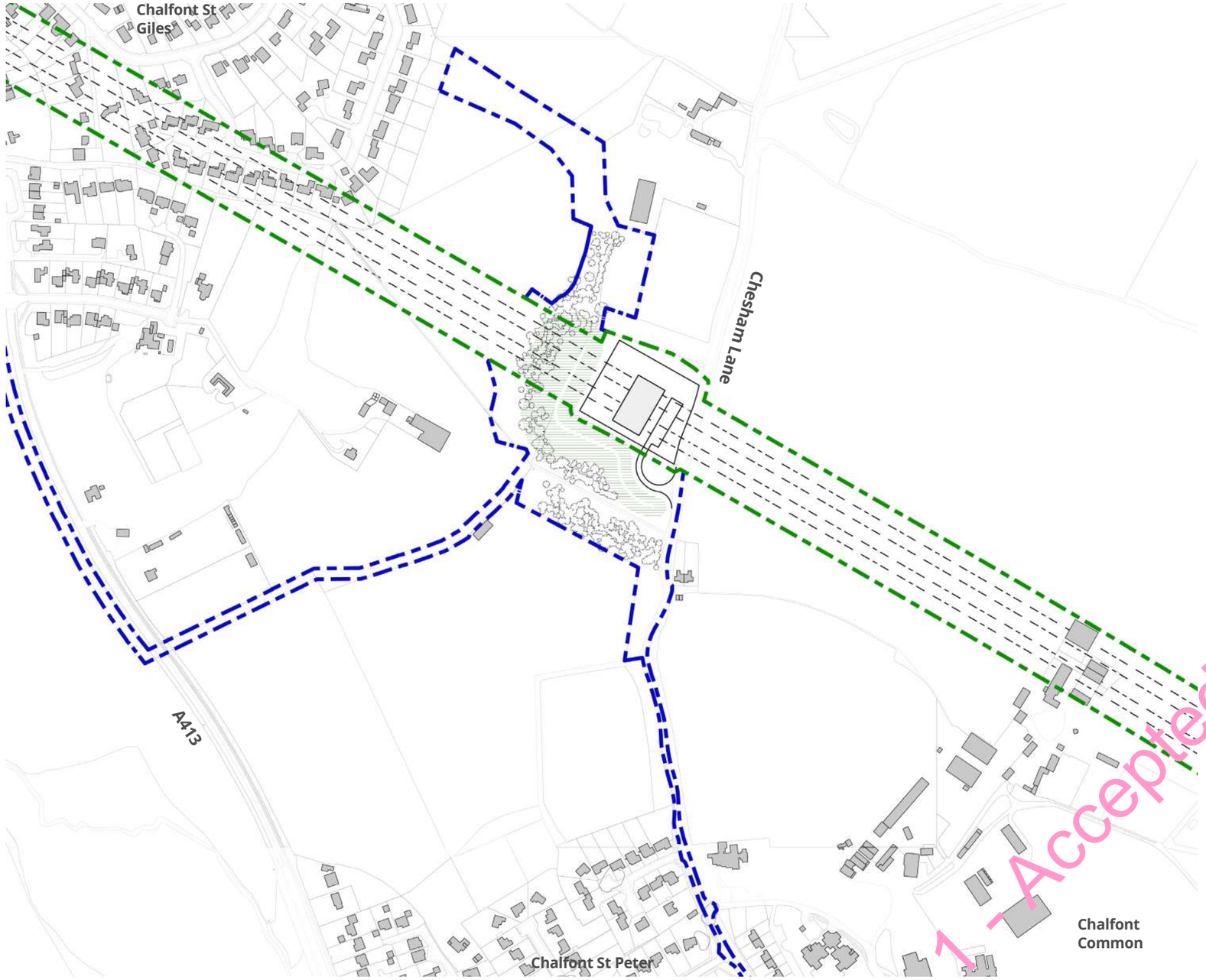

Fig.3.4_ Site plan - LOD and LLAU

3.2.2 Design

A plan of the hybrid Bill design for Chalfont St Peter is presented in the adjacent image.

The HS2 hybrid Bill design incorporated a 4m high single storey headhouse building with a foot print of 47m by 24m placed roughly in the centre of the site. A maintenance access road was provided to the south of the site adjacent to the environmental receptor PRoW Footpath CSG/32/1 and also close to the nearest residential receptor.

An area of 550sqm of hardstanding was provided around the headhouse structure. The compound appears to be located in a shallow cutting, as indicated by the area hatched in yellow to the northern and western edge of the compound. Land drainage was provided on the east side of the site along Chesham Lane and along the northern edge of the compound.

Landscape earthworks/ bunding was illustrated along the eastern and southern edges of the site with together with landscape mitigation planting, scrub and woodland to the back edge of the earthworks.

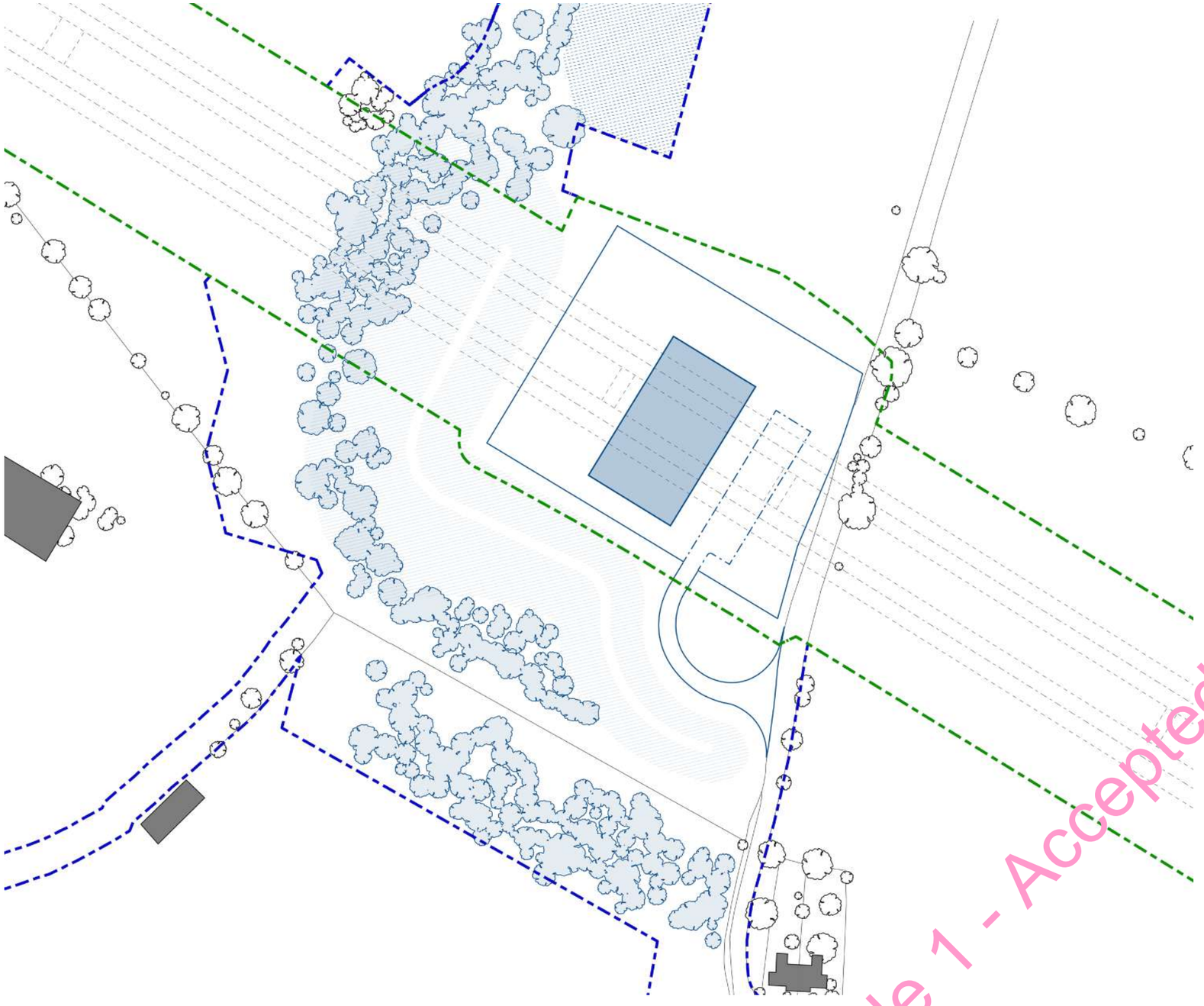

Fig.3.5_ Site plan - Hybrid Bill

Reference Documents

3.3

3.3.1 Overview

Reference Documents have been provided to W as key approaches to follow when developing the design. Some of these reference documents were developed with input from statutory bodies, either through consultation or engagement at relevant forums, such as the HS2 Phase One Planning Forum.

3.3.2 HS2 design approach documents

These documents provide design guidance and cover all key areas of programme work. The Design Approach documents do not prescribe what is required but are intended as a resource to help the team deliver the design of the railway to the standard that HS2 expects. The following approach documents have informed the developing design proposals for the Chalfont St Peter Vent Shaft;

- HS2-HS2-AR-GDE-000-000004 - P01 - Headhouse Buildings and Portals Design Approach
- HS2-HS2-EV-STR-000-000010: HS2 Landscape Design Approach
- HS2-HS2-AR-GDE-000-000015: HS2 Art Approach

3.3.3 HS2 technical standards

Technical standards provide the technical requirements and associated guidance for the design basis of the structural elements. Adoption of technical standards will help ensure a consistent approach to design across the whole project, minimising the assumptions that designers need to make to achieve the level of design quality demanded by a high speed railway.

3.3.4 Additional design documentation

Other documents that have informed the design include:

- 1D032-EDP-AR-REP-C000-000001 - P01- Architectural Definition for Headhouses in a Rural Environment
- HS2 Chilterns Enhancement and Integration Plan HS2 DDP

Fig.3.6_ Reference documents - HS2 design approach documents

Fig.3.7_ Reference documents - HS2 Chilterns Enhancement and Integration Plan

Undertakings and Assurances

3.4

3.4.1 Overview

The HS2 Act included a number of commitments made in relation to the development and delivery of the new high speed line. Recorded in a register accompanying the Environmental Minimum Requirements, a number of these Undertakings and Assurances (U&As) relate to the Chalfont St Peter Vent Shaft, ranging from noise attenuation to mitigating effects on ancient woodland located within the proximity of the railway. These U&As must be complied with. The full register of U&As can be found online:

https://www.gov.uk/government/publications/high-speed-rail-london-west-midlands-bill-register-of-undertakings-and-assurances

A concise summary of requirements relevant to Chalftont St Peter shaft can be found below:

- **U&A 34 -** Shafts to designed to be safe, efficient, and consistent with the requirements of whole-life operation and maintenance alongside initial buildability; sympathetic to their context, environment and social setting.
- **U&A 37 -** Consider common designs – discussions with local planning authority to determine appropriateness of the common designs to the local environment
- **U&A 39 -** Ensure that designs complement local aspirations and contribute to the natural and built environment.
- **U&A 53 -** Where a temporary or permanent realignment or diversion of a public right of way is unavoidable, the shortest practicable route has normally been adopted. In a few cases, users will be redirected using a reasonably convenient alternative route to a nearby public right of way or road, if suitable for non-motorised users prior to closure, with appropriate signing. Temporary arrangements required during construction will remain in place until the public right of way is either re-established or a permanent diversion or realignment is constructed. Public rights of way will also be re-established where 'cut and cover' tunnelling techniques are used.
- **U&A 70 -** As part of the project's principles for the development of a 'green corridor' (see information paper E11 - Green infrastructure and the green corridor) the areas will be either returned to their former use or re-designed to provide future multi-functional uses. An agreement will be reached for future upkeep and ownership with previous land owners or other interested parties. Where agreement cannot be reached, the land will be retained and maintained by the nominated undertaker until agreement is put in place. This could mean that such land would remain under the ownership of the railway.
- **U&A 90 -** Design, construct, operate and maintain the stationary systems so that the rating level of the fixed installations in normal operation at the worst affected residential receptor, minus the background level, is not more than -5 dB
- **U&A 93 -** Special consideration will be given to the assessment of sound from stationary systems when the background level is low, namely where the background levels are less than 30 dB.
- **U&A 639 -** The Promoter will require the nominated undertaker to use reasonable endeavours to ensure the design of any earthwork created in the Chilterns Area of Outstanding Natural Beauty (AONB) as a result of the HS2 works, which is subject to approval under Schedule 17 of the Bill, sensitively integrates into its surroundings by respecting natural contours and existing landscape features.
- **U&A 2118 -** Ensure that key design elements are designed to maintain the local environment and local amenity. The local community engagement process will be a key element in realising this objective
- **U&A 2597 -** The Secretary of State for Transport will require the nominated undertaker to locate the Chalfont St. Peter ventilation shaft as far as is reasonably practicable, without affecting the safe, timely and economic delivery of the project, away from Chesham Lane within the site identified in the Bill, to allow for more screening in front of the building.

3.5.1 Visual impact

Two key receptor viewpoints have been identified in the Environmental statement. These viewpoints have been assessed and given consideration throughout the design process.

Winter photographs and descriptions of these viewpoints are extracted from the Environmental Statement Vol 5 - CFA8 Chalfonts and Amersham - Landscape and Visual Assessment report.

Viewpoint 1 (065.3.001) is representative of typical views available from PRoW (Footpath CSG/32/1). This viewpoint is described as significantly affected in Operation Year 1 in the Environmental Statement. In Winter months the foreground view comprises an open agricultural field with a small woodland block to the north forming a vegetated back drop to the scene. Filtered views can be afforded through field boundary vegetation in winter, refer to Figure 3.9.

Viewpoint 2 (065.4.002) is representative of the view gained by road users on Chesham Lane looking north west. This viewpoint is described as significantly affected in Operation Year 1 in the Environmental Statement. In Winter months, in the foreground there are filtered and glimpsed views through boundary vegetation along Chesham Lane to an agricultural field in the middle ground (photograph taken from gap in hedge). The background views contain open pasture land with field boundary vegetation (illustrated in Figure 3.10). The boundary vegetation on the far side of the field allows a glimpsed view of properties in the distance.

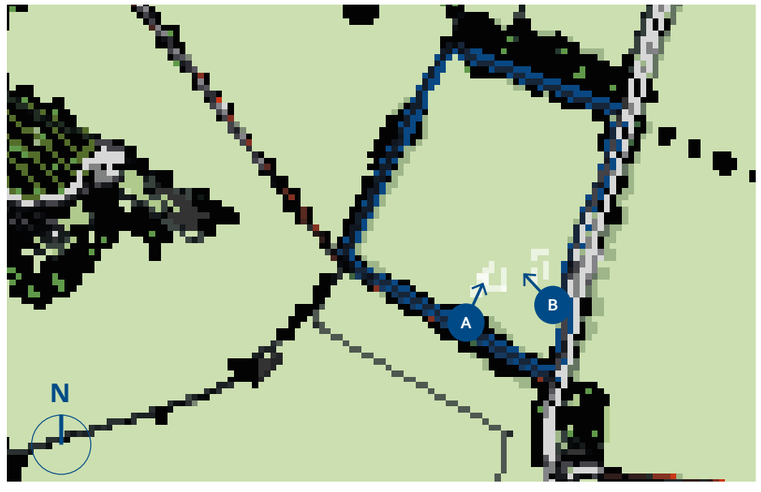

Fig.3.8_ Key plan - Environmental views

A Fig.3.9_ Photograph - Viewpoint 1_ 065.3.001 (date taken: 19 February 2013)

B Fig.3.10_ Photograph - Viewpoint 2_ 065.4.002 (date taken: 14 June 2013)

3.5.2 Sound and noise

The compound is set within largely open countryside, with the settlement of Chalfont St Giles located approximately 200m north-west. The landscape strategy should prioritise the integration of the head house and supporting infrastructure into the landscape setting.

Two public rights of way Footpath (CSG/32) are located within close proximity of the proposed compound. The landscape design will fully consider these and the surrounding settlements, ensuring existing hedgerows and field boundaries are protected and 'gaped-up' where practicable to manage views of the site.

In addition to the settlement of Chalfont St Giles, a number of isolated properties are located nearby. The most notable of these are Cricket Field Cottage, Ashwell's Farm, 19 Valentine's Way, Turners Wood Farm, 24 The Brow and 26 The Brow. Therefore, the introduction of sources of operational and ground-borne noise and vibration and lighting could potentially impact on the residential properties in the area. The assessments of operational airborne and operational ground-borne noise and vibration has concluded that there would be no significant effects for noise and vibration based on the current detailed design.

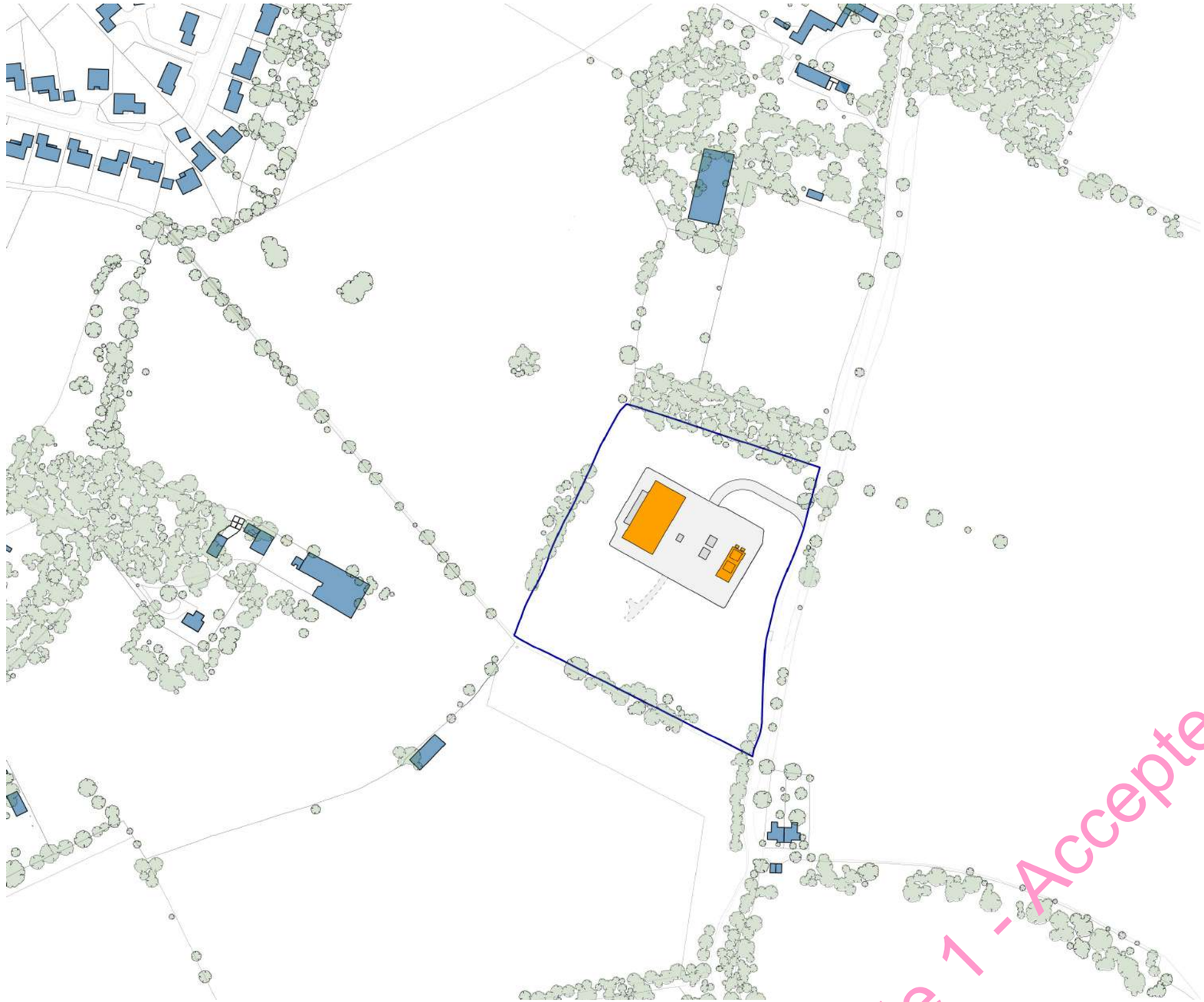

Fig.3.11_ Site plan - Sound and noise

Specimen Design

3.6

3.6.1 Overview

In advance of appointing the Main Civils Contractors HS2 commissioned a number of Specimen Designs to provide initial feasibility and design studies for headhouses in a rural environment (1D032-EDP-AR-REP-C000-000001).

The Chalfont St Peter Specimen Design layout optimised the site arrangement from the hybrid Bill and reduced both the compound area and headhouse footprint. The headhouse footprint was reduced significantly from approximately 47x24m (1128sqm) to 25x25m (625sqm).

The location of the access road was retained in the same place however the area of new embankments/ landscape earthworks was also reduced significantly meaning the existing mature tree line running along the rear of the site could be retained. The specimen design added an additional embankment in front of the headhouse to provide additional screening from Chesham Lane.

Fig.3.12_ Visualisation - Specimen design view from Chesham Lane

3.6.2 AONB response

Despite being just outside of the AONB the Chilterns Enhancement and Integration Plan (CEIP) document offers a number of location specific design development principles (DDP) for Chalfont St Peter Vent Shaft. The following requirements have been given consideration during the design process.

- Move hard-standing away from Chesham Lane as part of design development within Act Limits or supplement planting outside of Act limits through Additional Projects. A minimum width of hedgerow/ copse should be provided adjacent to the lane.
- Protect existing lane-side trees and hedges during construction and reinstate on completion (subject to visibility splays which should be kept to the minimum)
- Use existing copse north of site to inform character of new copse planting on all sides of the facility within Act Limits and also outside Act Limits to north, west and east where leftover space is insufficient for viable agriculture.
- Use mix of semi-mature, feathers and forestry transplants to accelerate effective screening.

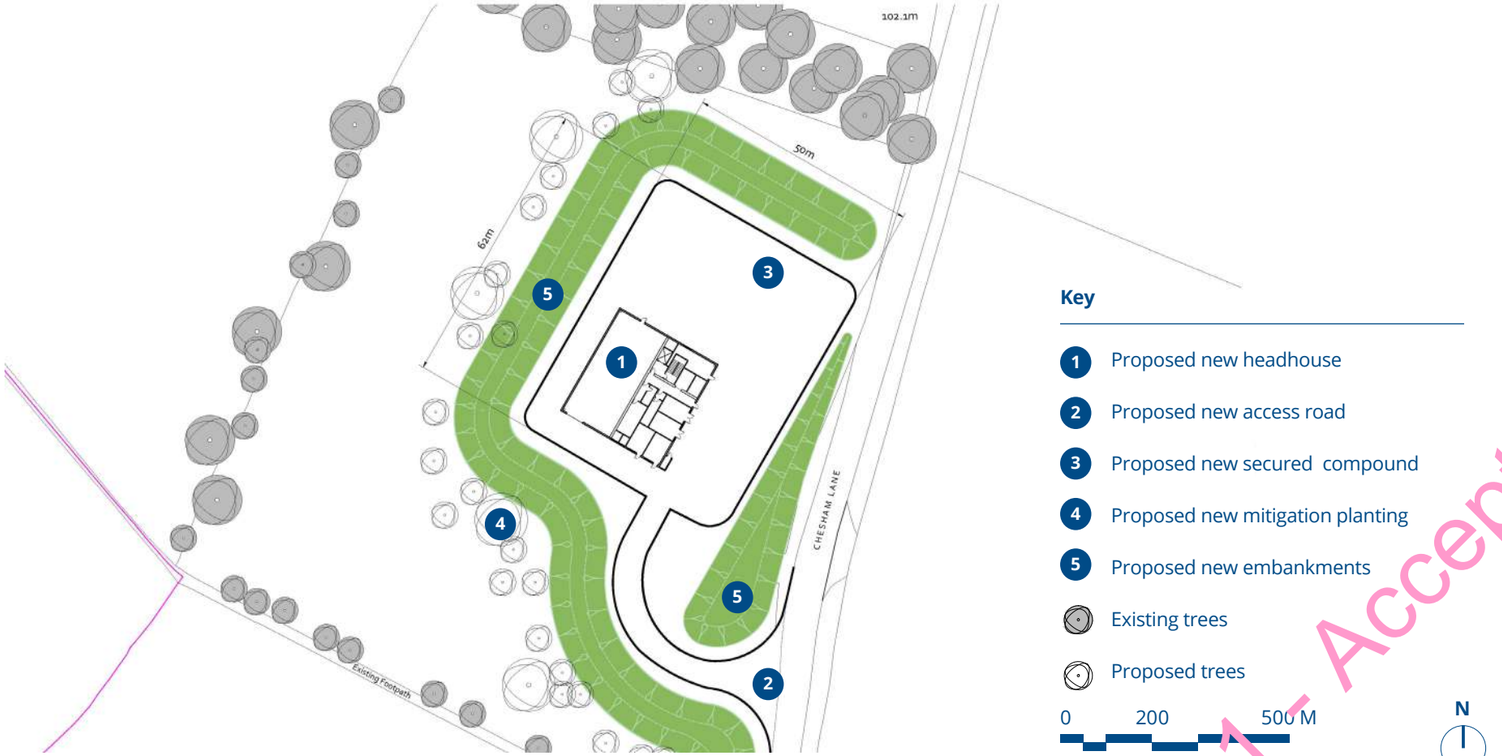

Fig.3.13_ Site plan - Specimen design site arrangement

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4.0
Design Vision

Encapsulates the overall design vision for the Chalfont St Peter Ventilation Shaft and associated landscape through a series of key design objectives and visualisations.

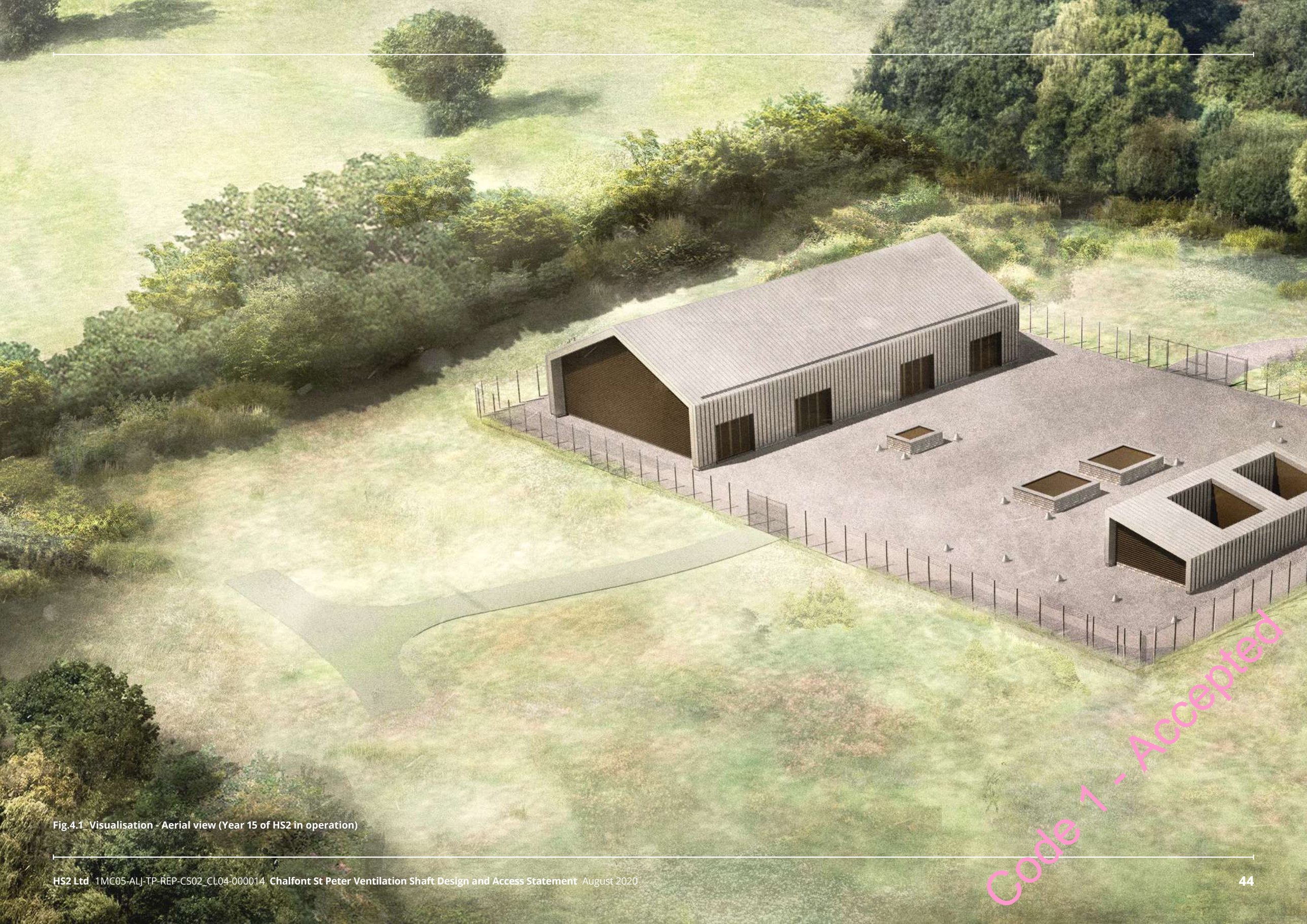


Fig.4.1_ Visualisation - Aerial view (Year 15 of HS2 in operation)

4.1

Contextual and Responsive

The Chalfont St Peter Ventilation Shaft is highly responsive to local agricultural and industrial buildings and its surrounding landscape. The farmyard compound arrangement and pitched roof building forms are designed to complement the local context. The buildings are located away from the road and orientated to conceal them as far as possible from public view.

Fig.4.2_ Visualisation - View from Chesham Lane looking West (Year 1 of HS2 in operation)

4.2

Cohesive and Enduring

A coherent and common design language has been applied to the Chalfont St Peter Ventilation Shaft buildings. The buildings are wrapped in a simple, continuous zinc 'skin', while door and ventilation openings are recessed and treated in a different material. Robust and enduring building materials have been carefully selected to reflect the local context, reduce long-term maintenance and maximise design life.

Fig.4.3_ Visualisation - View from Chesham Lane looking West (Year 15 of HS2 in operation)

Fig.4.4_ Visualisation - View from public footpath (Year 1 of HS2 in operation)

4.3

Recessive and Integrated

The landscape design is fundamental to the sensitive integration of the Chalfont St Peter Ventilation Shaft into its site and local context. Together with the existing landscape, proposed planting has been designed to discreetly shelter the compound from public view. The buildings use a simple and robust material palette, informed by local agricultural and industrial buildings.

Fig.4.5_ Visualisation - View from public footpath (Year 15 of HS2 in operation)

5.0 Headhouse Design

Summary and justification of the Chalfont St Peter Ventilation Shaft design proposals relating to the headhouse and ancillary buildings.

Key Considerations

5.1.1 Initial design development - Site compound

The diagrams opposite illustrate how the design of the compound has developed from the hybrid Bill stage and specimen design stage to the Schedule 17 design:

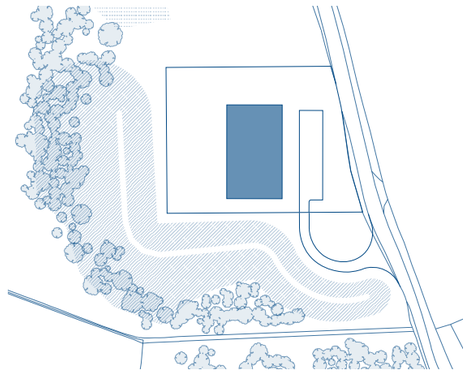
- **Hybrid Bill design:** A large compound area and single large building with the access close to Cricket Field Cottages, the proposed earthworks include extensive bunding and loss of existing tree line.
- **Specimen design:** The compound and building are reduced in size. However, the access remains close to Cricket Field Cottages and the proposed earthworks include uncharacteristic embankments to all sides.
- **Schedule 17 proposals:** The size of the compound area is reduced further and the main headhouse building is moved away from Chesham Lane. The access road is moved away from Cricket Field Cottages. The existing tree line is maintained and reinforced with additional planting, removing the need for excessive bunding.

5.1.2 Initial design development - Headhouse

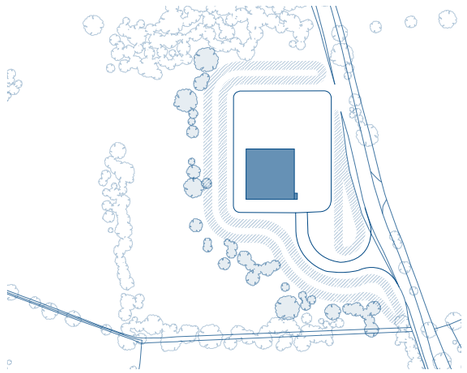
Following the appraisal of the hybrid Bill and Specimen Design, the following key design strategies were identified for the headhouse:

- **Flat roof to pitched:** Rather than rectangular block, as proposed in the hybrid Bill. a pitched roof form reduces the overall scale and volume of the headhouse building.
- **Reduce eave height:** A reduced eave height allows for the overall scale of the main headhouse to appear smaller.
- **Contextual like-ness:** The pitched roof form of the headhouse betters reflects local agricultural and industrial buildings.

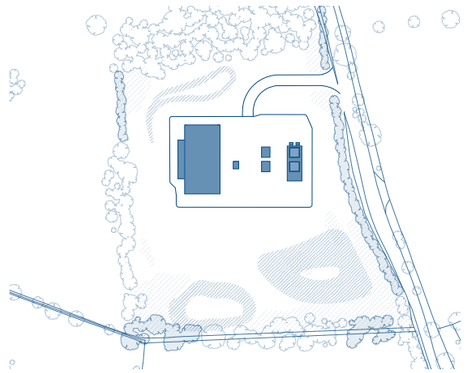
Hybrid Bill



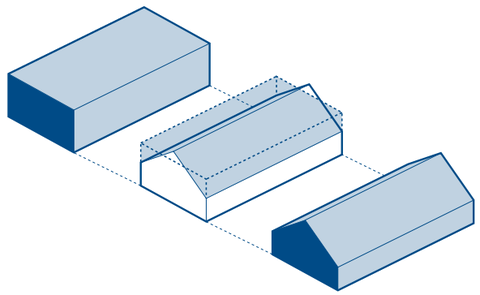
Specimen Design



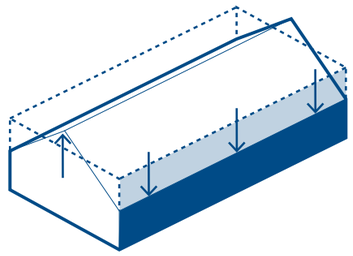
Schedule 17 Proposals



Flat roof to pitched



Reduce eave height



Contextual like-ness

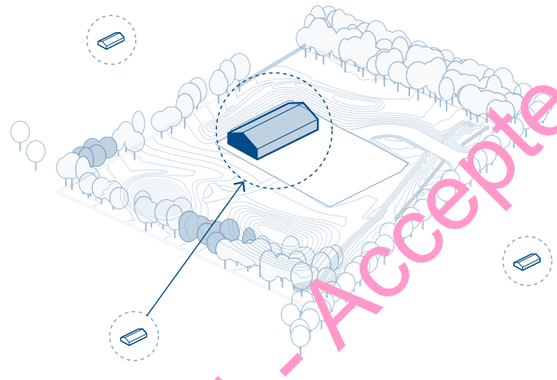


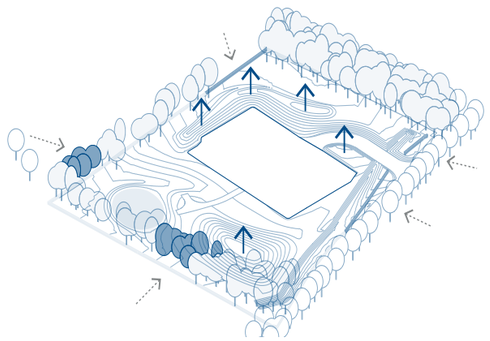
Fig.5.1_ Diagrams - Initial design development

5.1.3 Key design principles - Site compound

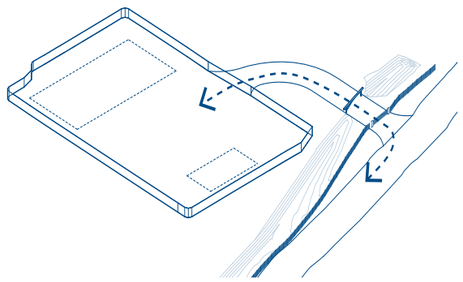
The key design principles for the site compound and surrounding landscape proposals are as follows:

- **Landscape integration:** The surrounding topography has been raised and additional trees and hedgerows planted to conceal the compound and headhouse.
- **Access:** An agricultural style fence and gate has been incorporated alongside Chesham Lane. Within the site, a security fence is required around the compound area.
- **Agricultural courtyard arrangement:** The compound arrangement is similar to a typical agricultural courtyard and the overall footprint has been kept as small as

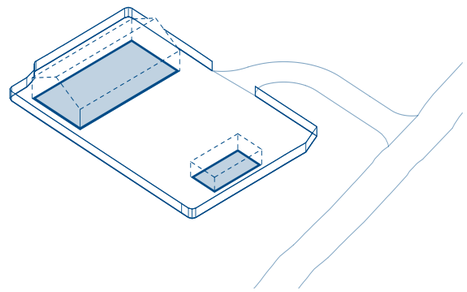
Integration within landscape



Access



Agricultural courtyard arrangement

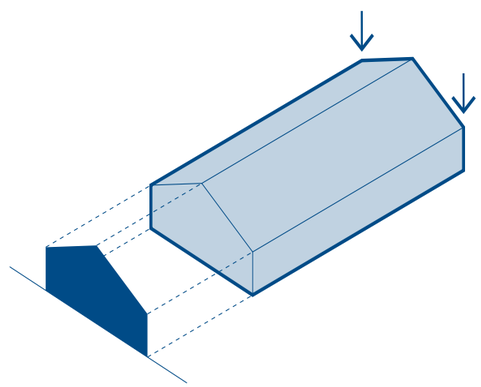


5.1.4 Key design principles - Headhouse

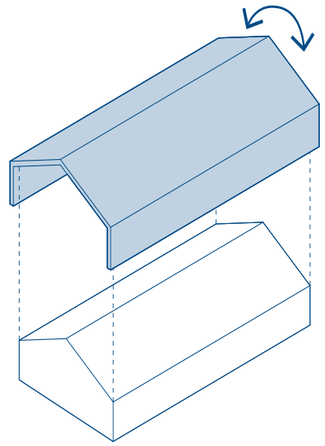
The key design principles for the headhouse and ancillary buildings are as follows:

- **Form and scale:** The building heights are reduced where possible and maintain a familiar scale and form to local agricultural buildings.
- **Roof wrap-around:** The roof of the main headhouse building wraps around the building creating a simple agricultural barn shape.
- **Door and ventilation openings:** Door and ventilation openings are pushed in and treated in a different material, resulting in a simple and coherent appearance to the buildings.

Form and scale



Roof wrap-around



Door and ventilation openings

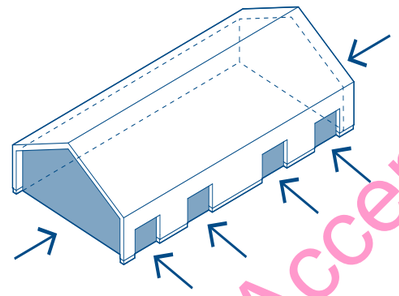


Fig.5.2_ Diagrams - Key design principles

Use

5.2.1 Key functional requirements

The functional requirements for Chalfont St Peter Vent Shaft have been accommodated by:

- Providing a tunnel ventilation fan system oriented horizontally within the basement box, reducing the excavation required relative to positioning the fans within the shaft.
- Providing the necessary space for mechanical and electrical plant equipment to support the operation of the railway. In positioning some of the equipment below ground, the above ground structures can be reduced in scale and designed more sympathetically to their surroundings.
- Providing intervention access for the emergency services to respond to an incident and a separate means of escape from the basement box.

The following key operational requirements will also be implemented:

- Weekly testing of the operation of the fans will be controlled remotely, so access to the compound will not be required.
- External lighting will be on a PIR sensor which will illuminate the compound in the case of unwanted intrusion or in an emergency situation.
- There will be no permanent lighting of the headhouse building or compound.
- Security of the compound from errant vehicles is achieved with a discreet errant vehicle ditch positioned behind the hedge adjacent to Chesham road. The secure vehicle gate is positioned behind an agricultural style timber gate.

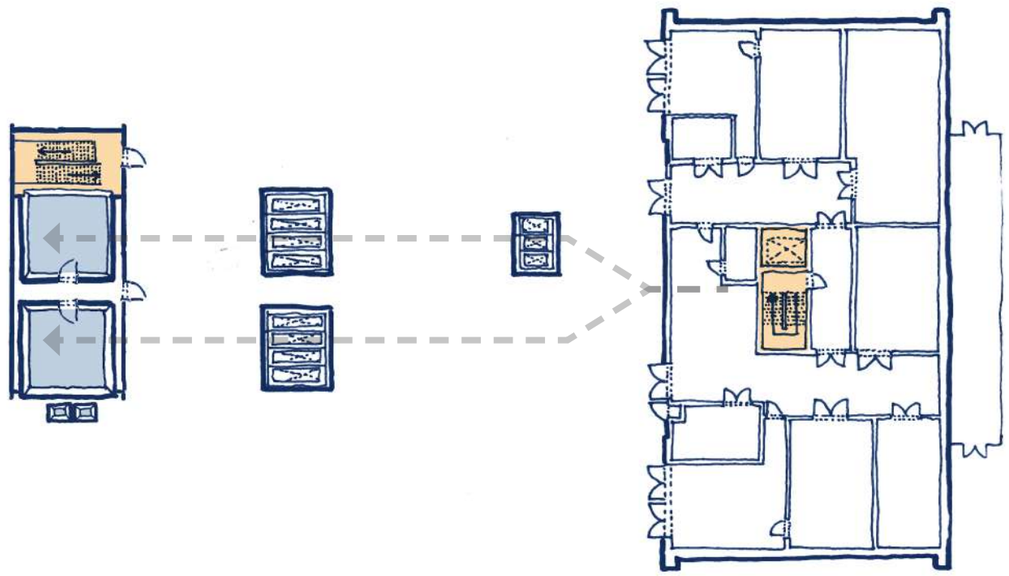


Fig.5.3_ Proposed basement plan

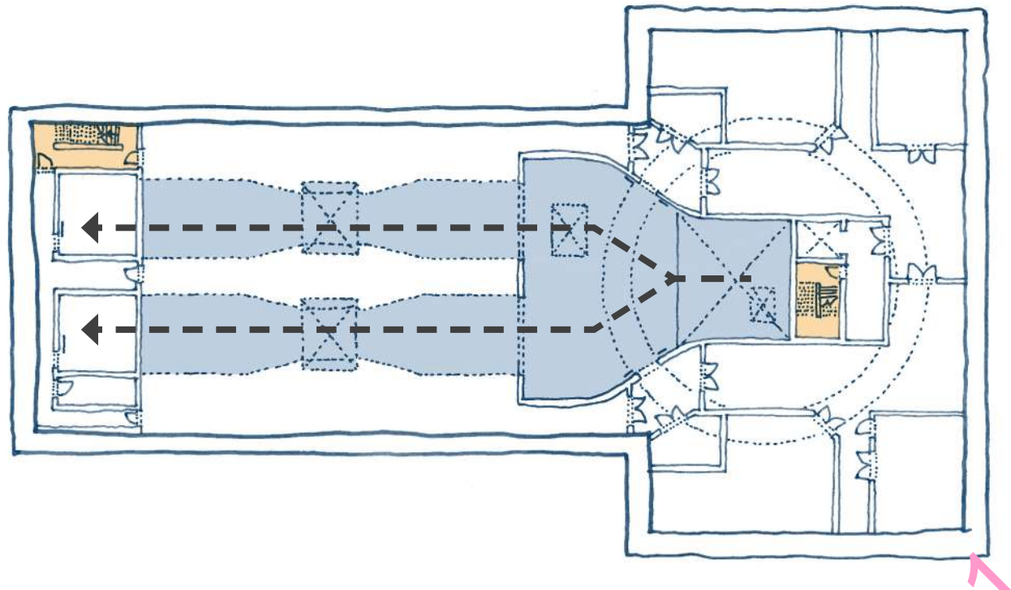


Fig.5.4_ Proposed ground floor plan

Key

Ventilation route

Vertical circulation - Intervention/ escape route

5.2.2 Headhouse

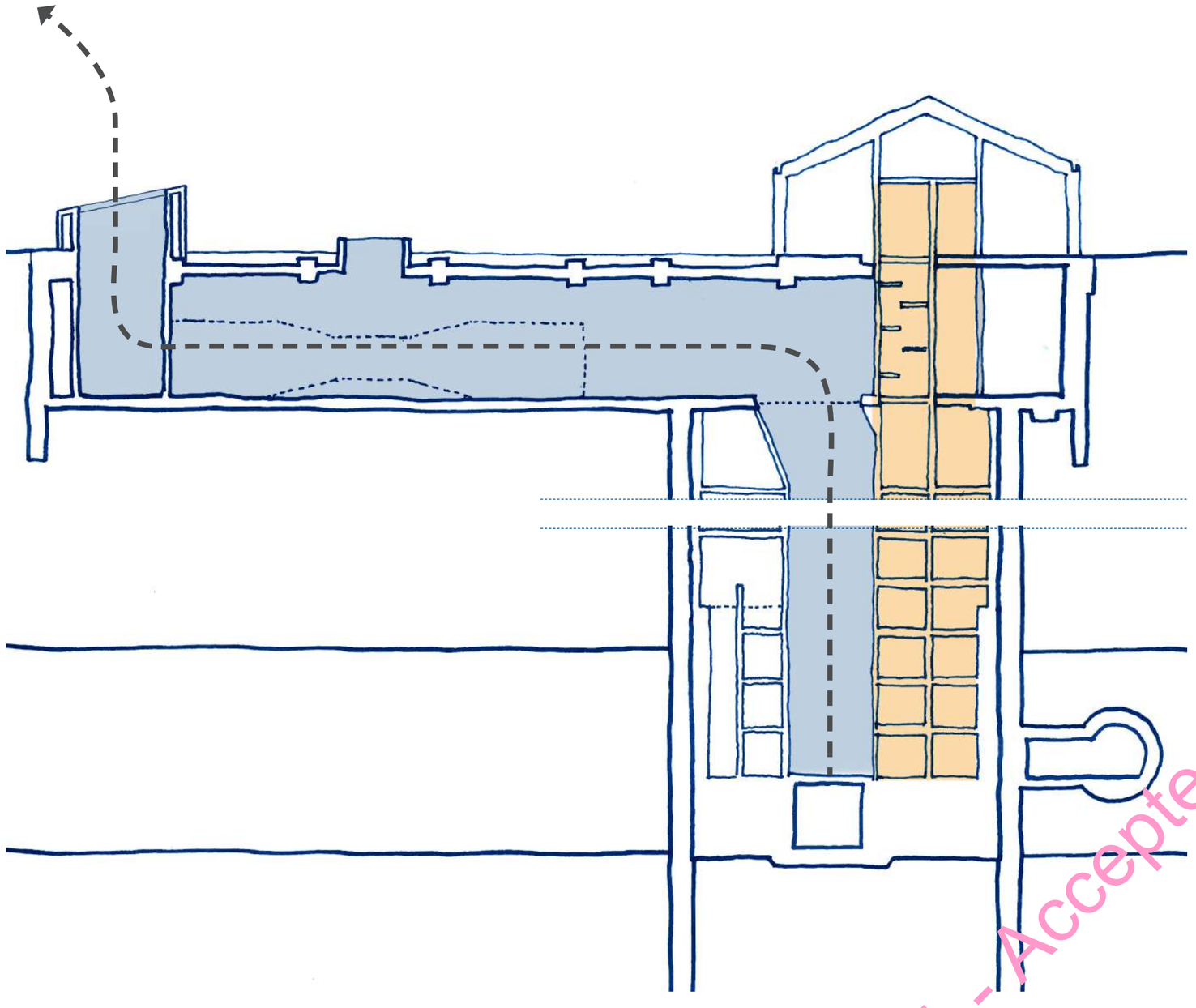
For operational and maintenance purposes a number of plant and operation rooms will need to be located above ground level within the headhouse building, including:

- Transformer rooms
- Mechanical ventilation rooms
- Intervention stairwell and lift
- Escape staircase

Given the shaft configuration, the buildings comprise a headhouse building and collection of ancillary structures. The headhouse building will accommodate the intervention lift and stairwell and plant/operational rooms linked to the shaft. The ancillary structures will facilitate extract and supply to the ventilation fans. This arrangement avoids a monolithic structure and represents a courtyard like compound arrangement which is considered to be in keeping with the local context.

The building situated over the shaft has a footprint of approximately 18m x 36m. The developed configuration locates plant rooms adjacent to external walls to facilitate access and natural ventilation. The rooms will be serviced by two internal corridors. To minimise the height of the headhouse building, room heights have been reduced to a minimum.

A secondary smaller monopitch building is positioned above the eastern end of the basement box. This building has a footprint of approximately 7.5m x 18m and a ridge height of 4.2m. It contains the escape stair from the basement box and two tunnel ventilation openings. The vents need a minimum opening height of 3m to ensure that, in the event of a fire in the tunnels, smoke is able to clear above head height of the emergency services.



Key

Ventilation route

Vertical circulation - Intervention/ escape route

Fig.5.5_ Long section

Layout

5.3.1 Compound arrangement

The Chalfont St Peter Vent Shaft buildings are arranged around a compound, making reference to agricultural compounds found in the local rural context. The compound buildings are positioned away from the main road and away from the Public Right of Way.

The headhouse building is placed at the far left of the site furthest away from public viewing points in the middle of the site. The smaller, ancillary structures (access hatches, ventilation and stair building) are placed in front of the headhouse when viewed from Chesham Road, and follow the length of the ventilation plenum and fan room in the basement box below.

The proposed landscaping and strengthening of existing planting will create a visual and noise buffer between the site and it's surroundings.

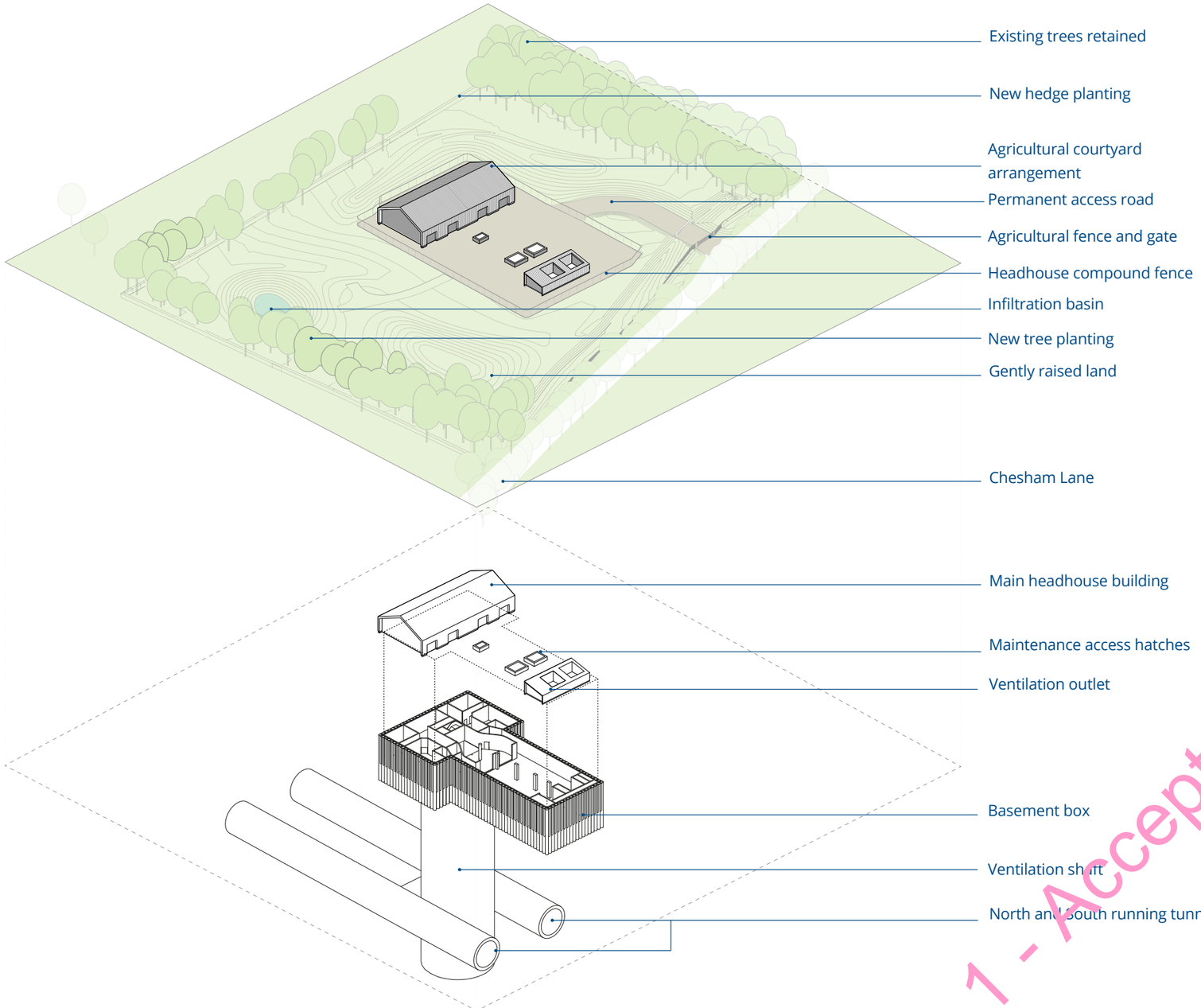


Fig.5.6_ Axonometric - Site diagram

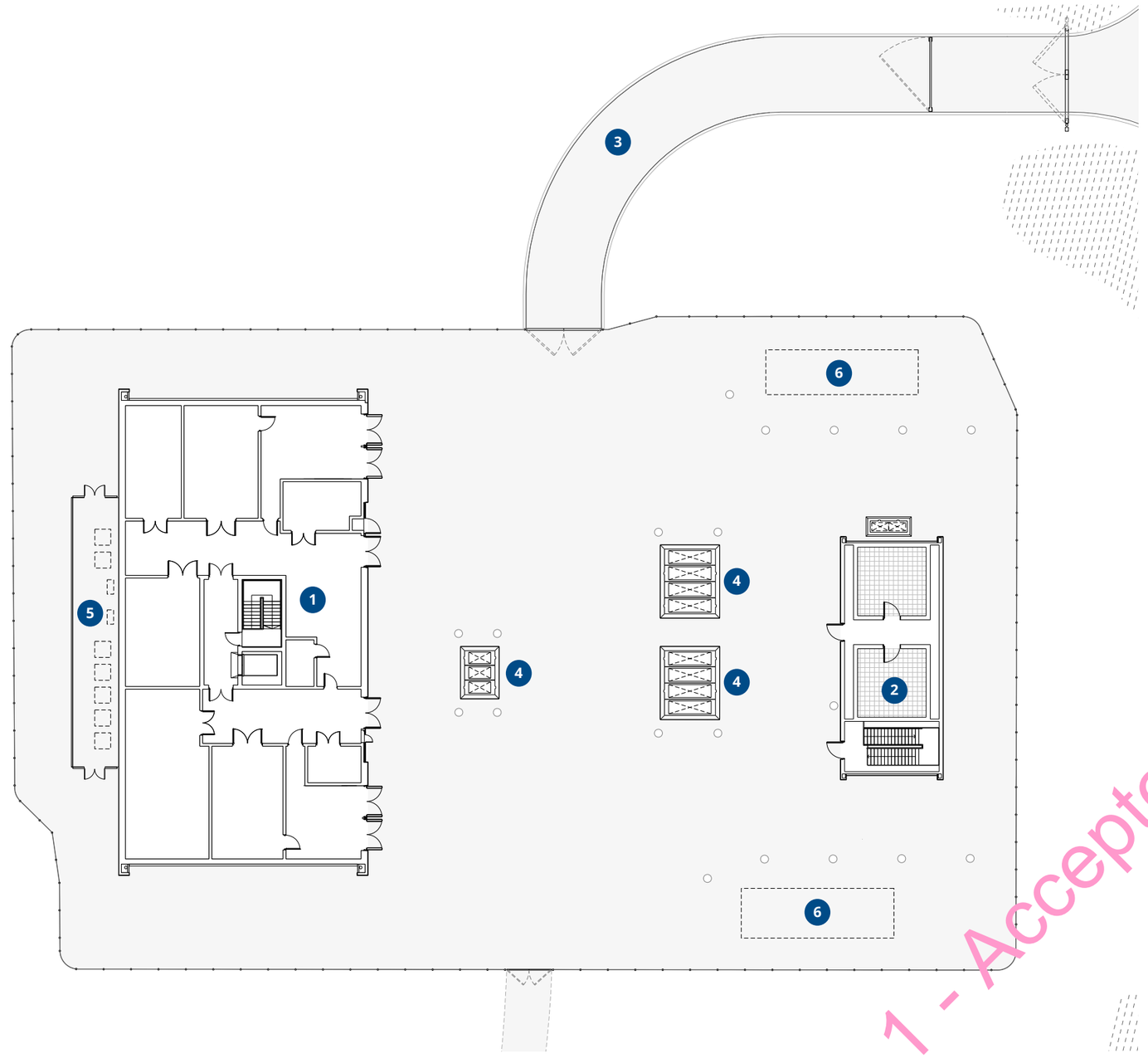
5.3.2 Building arrangement

The headhouse building is positioned centrally over the shaft and is oriented perpendicular to the direction of the running tunnels. All building entrances face into the courtyard, which is typical of agricultural style buildings. At the rear of the headhouse there is an area for the external air condenser units, this is an open top louvered enclosure providing visual screening.

The location and orientation of other structures on the site is determinated by the basement box below, which is oriented parallel to the running tunnels.

At the centre of the compound there are three external access hatches over the basement box. The two larger access hatches are positioned over the fans to enable maintenance and replacement of fans.

On the opposite side of the compound to the headhouse is the stair and ventilation building. The stair provides a secondary means of escape from the basement box and the ventilation openings act as inlet and outlet for the ventilation fan system. Either side of these structures there are below ground water tanks protected from heavy vehicle loadings by bollards.



Key

1. Main headhouse
2. Stair and vents building
3. Main access road
4. External access hatch
5. Louvered fence enclosure
6. Basement level water tanks

Fig.5.7_ Ground floor plan - Compound arrangement

Scale

5.4.1 Headhouse

The main building compound is 18.2 m wide, 35.5 m long and 9.4 m tall. These dimensions, including the size of the entry points into the building and key heights, are illustrated in Fig. 5.8 on the right.

A number of different building forms have been tested in close collaboration with the Local Authority and Chilterns AONB Review Group. These options included variants on both flat and pitched roof structures. Pitched roof forms are preferable from a long-term operation and maintenance point of view due to the perception that flat roof structures are more likely to leak. The design team reviewed different pitch roof arrangements and concluded the preferred solution is a gable ended pitch roof. This form of structure is common among agricultural and industrial buildings in the Chiltern context. The doors and access points into the building have been enlarged in order to make the headhouse appear smaller in scale and closer in like-ness to nearby agricultural buildings.

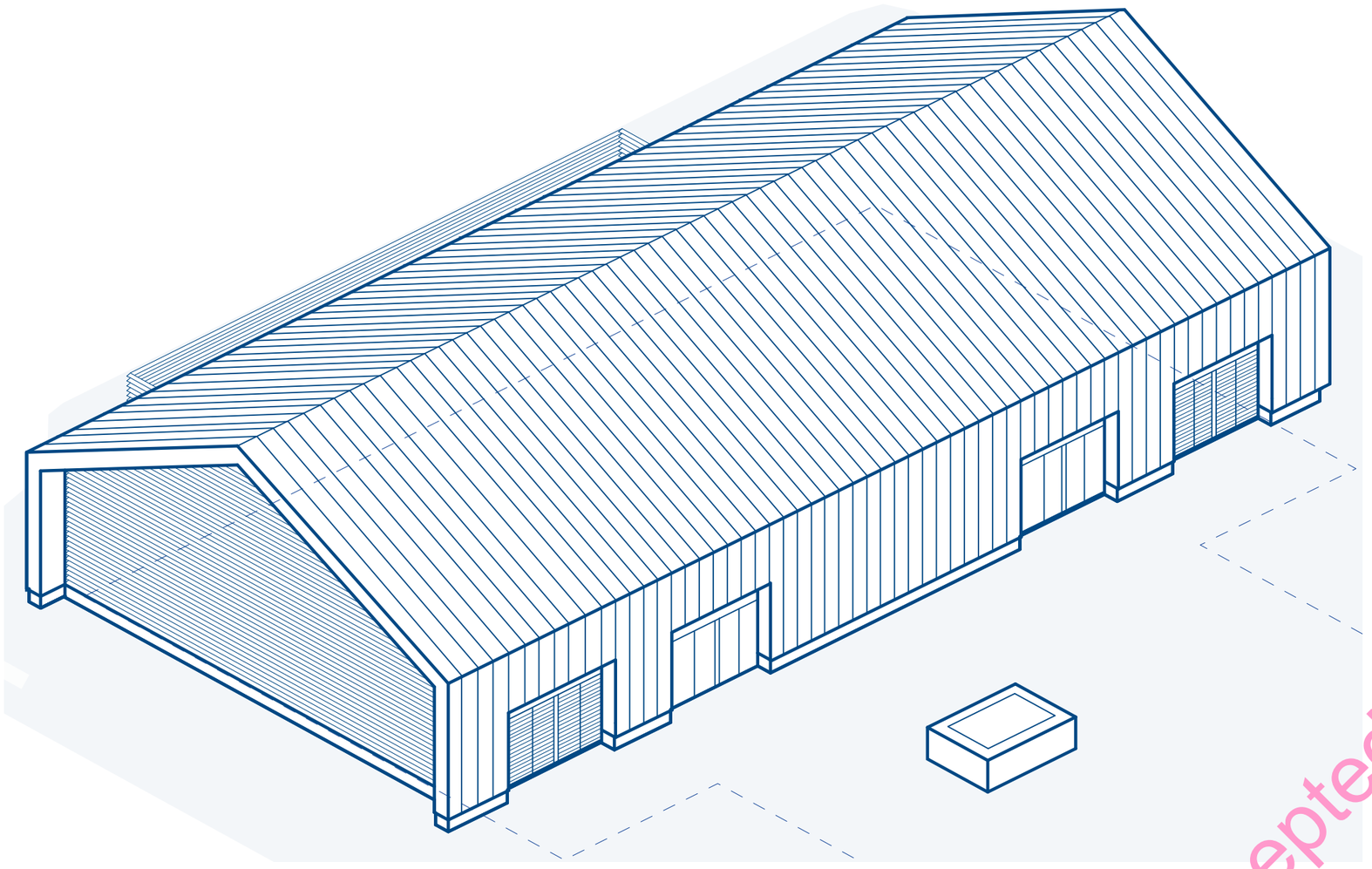


Fig.5.8_ Axonometric - Headhouse building

5.4.2 Stair and vents building

The largest of the ancillary structures contains a second means of escape stair from the basement box and two tunnel ventilation fan outlets. A single building encases the staircase and ventilation outlets under one simple, mono-pitched roof - a form sympathetic to the rural agricultural context. The building is clad in a zinc roof wrap with recessed louvred openings at either end. Using the same architectural approach as the headhouse helps to achieve a simple and coherent appearance to buildings with varying functional requirements. The footprint of the building has been kept as small as possible whilst maintaining a simple well-proportioned form and providing ventilation openings at the minimum required height of 3m.

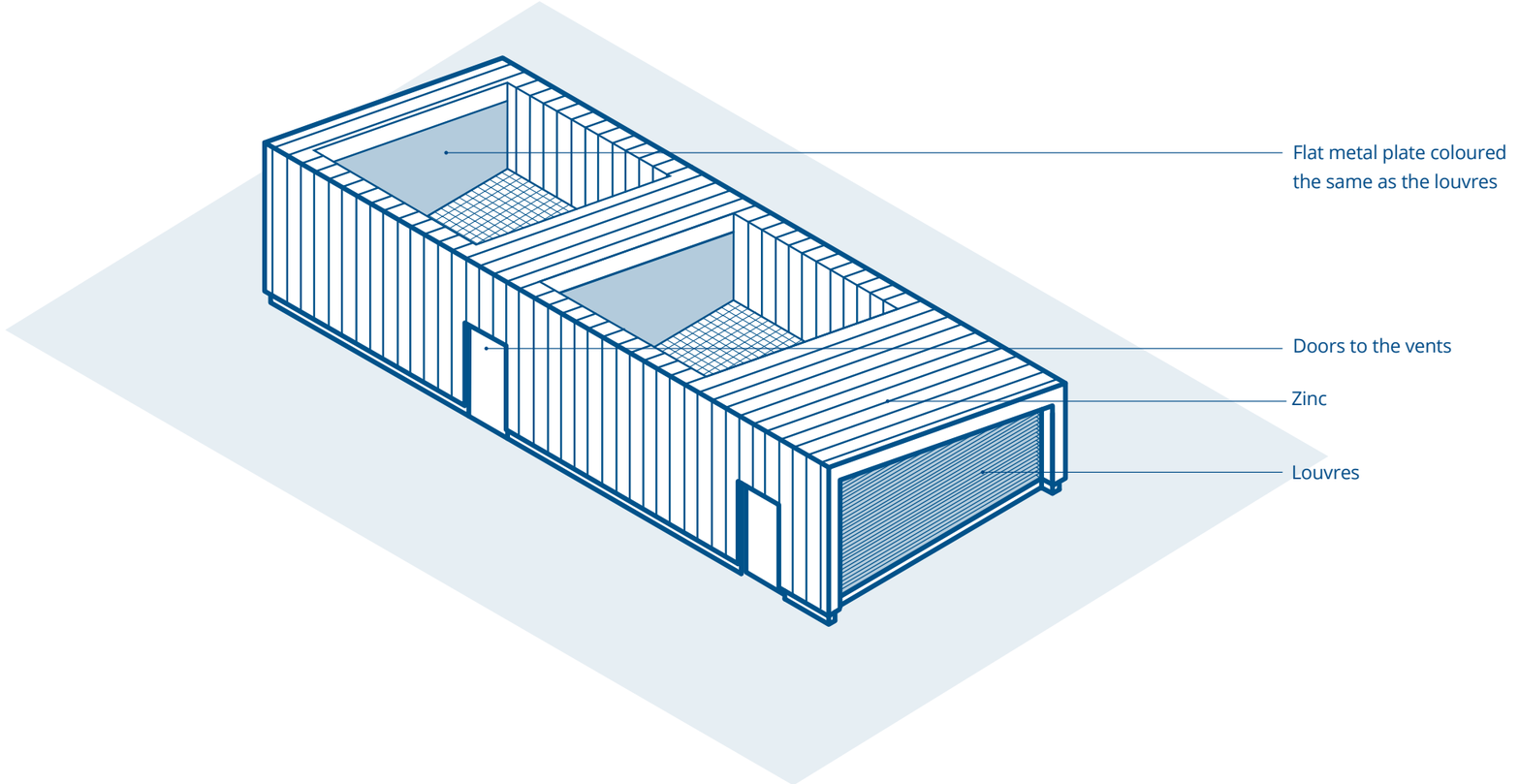


Fig.5.9_ Axonometric - Stair and vents building

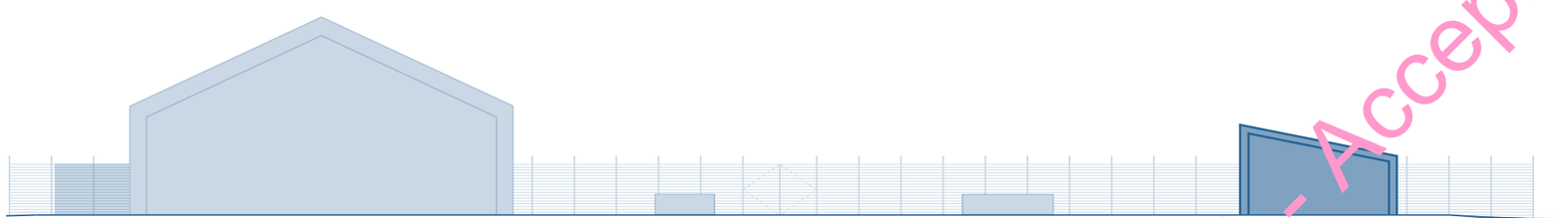


Fig.5.10_ Diagrammatic South-West elevation

Appearance

5.5.1 Headhouse envelope design

As well as building form, a variety of different material and envelope design options have been tested. The material selection will play an important role in ensuring that the buildings are sympathetic to the local context. In addition to an integrated landscape design, a carefully detailed and considered building envelope will ensure that the design proposals complement its rural setting.

On the headhouse a pitched roof form is considered the most appropriate design approach. Whilst the overall ridge height is higher than the top of a flat roofed building, the perceived scale of the building is lessened by lowering the eaves.

A variety of material compositions were tested for the building envelope. The preferred approach comprised a standing seam zinc wrap-around roof and louvered gable ends. The use of more industrial materials ensure robustness, durability and low maintenance, ensuring the building will age gracefully over time.

The proposed materials also represent the use of the building as a key element of an infrastructure project, rather than deliberately masking them as specific agricultural or residential buildings.

Fig.5.11_ Visualisation - Horizontal ceramic cladding with louvered gable ends

Fig.5.12_ Visualisation - Standing seam cladding with louvered gable ends (preferred option)

5.5.2 Historic precedents

A study was done of historic agricultural buildings in the surrounding area. There were a few key features that applied in most cases:

- A simple roof form, usually gable ended and sometimes with a small hipped section of roof
- Horizontal timber cladding
- A brick plinth on which the structural frame sits, for robustness at low level and to raise the timber frame off of the ground

5.5.3 Industrial agricultural precedents

Also included on this page are some more contemporary examples of agricultural/industrial barns in the surrounding area. Generally the same principles apply but the scale is larger and the structural spans are longer with a shallower pitch on the roof.

5.5.4 Material precedents

Applying the lessons learnt from looking at the historic and contemporary local precedents a simple material palette has been proposed, including:

- Pre-patinated standing seam zinc cladding 'roof-wrap', which emphasises the simple gable ended form of the building.
- Painted steel louvres which make reference to the horizontal timber siding of local precedents.
- An engineering brick plinth to raise the headhouse off the ground.

The proposed material palette has been selected for their simple appearance, durability, robustness and sustainability. Zinc is a naturally weathering material and both steel and zinc are readily recyclable and reusable at end of life.

Fig.5.13_ Photograph - Skippings barn

Fig.5.14_ Photograph - Northolt barn

Fig.5.15_ Photograph - Didcot cart shed

Fig.5.16_ Photograph - Lower bottom house barn

Fig.5.17_ Photograph - Lower bottom house barn

Fig.5.18_ Photograph - Lower bottom house barn

Fig.5.19_ Roof wrap - Pre-patinated zinc

Fig.5.20_ Louvred gable - Painted steel

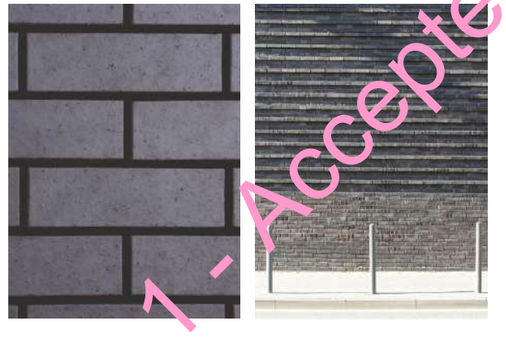


Fig.5.21_ Plinth - Blue engineering brick

Appearance

5.5.5 Louvres colours

A study of different colour options for the louvered areas and openings has been undertaken. The proposed colour of these elements relate to the setting of the CSP site. The proposed grey-brown colour will help embed the buildings into their surroundings, particularly in the winter months when vegetation around the site is less dense and the compound is more visible.

Fig.5.22_ Colour palette study

Fig.5.23_ Visualisation - Dark grey louvre

Fig.5.24_ Visualisation - Grey-brown louvre

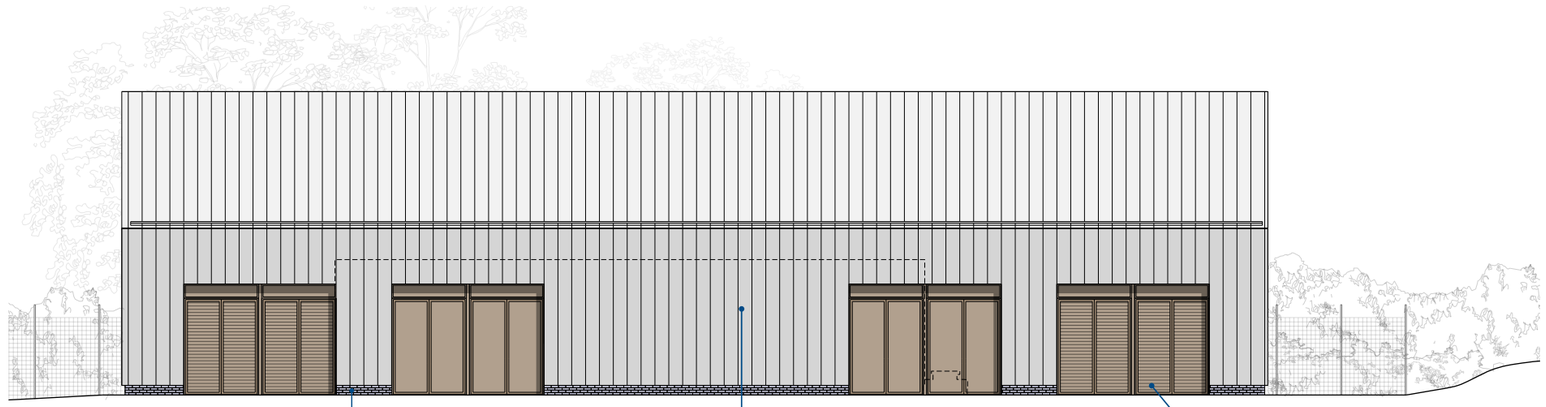
Fig.5.25_ Visualisation - Orange/brown louvre

5.5.6 Material palette

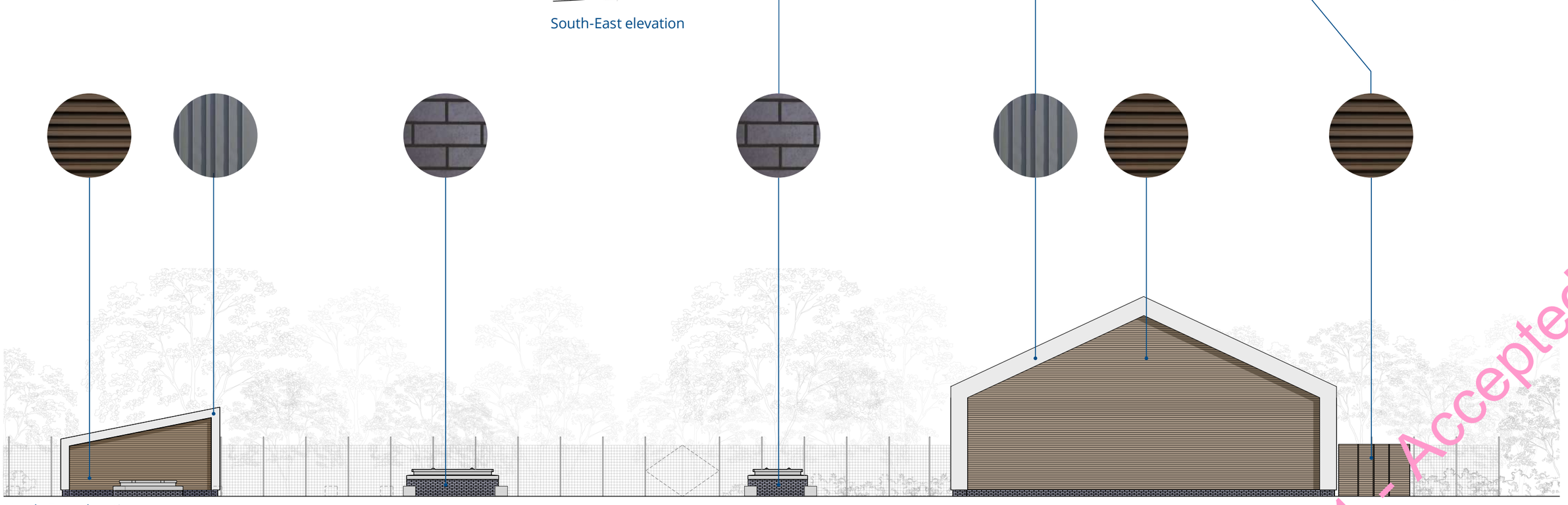
The building colour and detail has been designed to blend with the landscape setting of CSP, using a simple palette of materials inspired by the local agricultural buildings.

These materials will be durable and designed to age naturally over time without loosing robustness and quality. Dark, neutral colours will ensure the buildings do not stand out.

The roof wrap around will be made from pre-patinated grey zinc in a vertical pattern. Openings use horizontal grey-brown louvres to provide contrast to the vertical zinc. The building will sit upon a dark blue brick plinth, typical of agricultural buildings.



South-East elevation



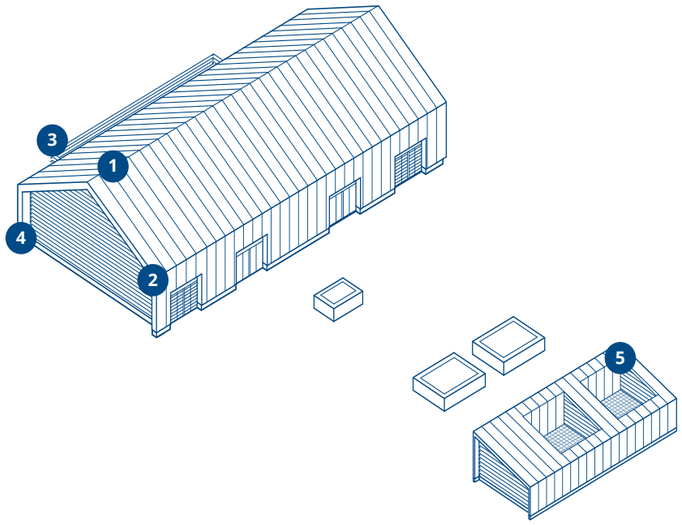
North-East elevation

Fig.5.26_ Elevation materials

Appearance - Key Details

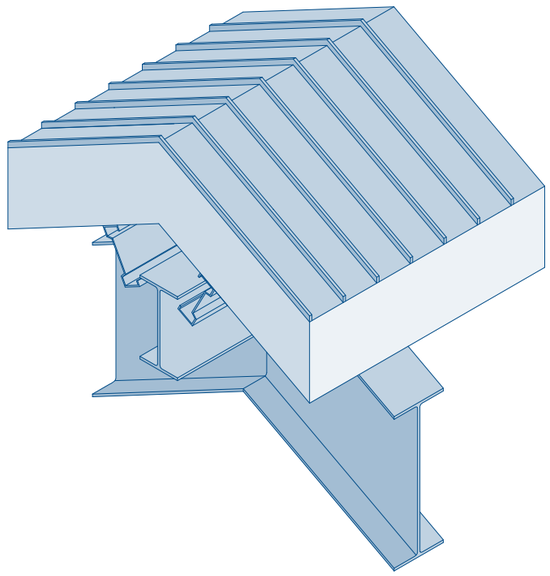
5.6.1 Building design key details

All buildings and ancillary structures have been designed using a common design language to ensure they appear consistent, coherent and sympathetic to the rural agricultural context.



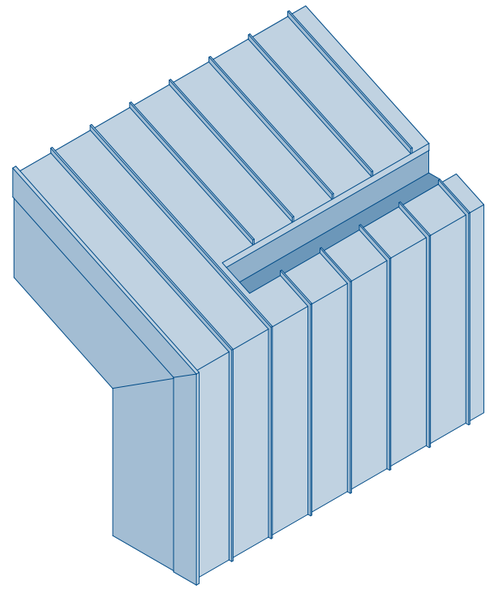
1. Roof ridge
2. Zinc roof eave and gutter
3. Louvered fence corner
4. Brick plinth and recessed louvre
5. Vent Openings

Fig.5.27_ Design key details



5.6.2 Roof ridge

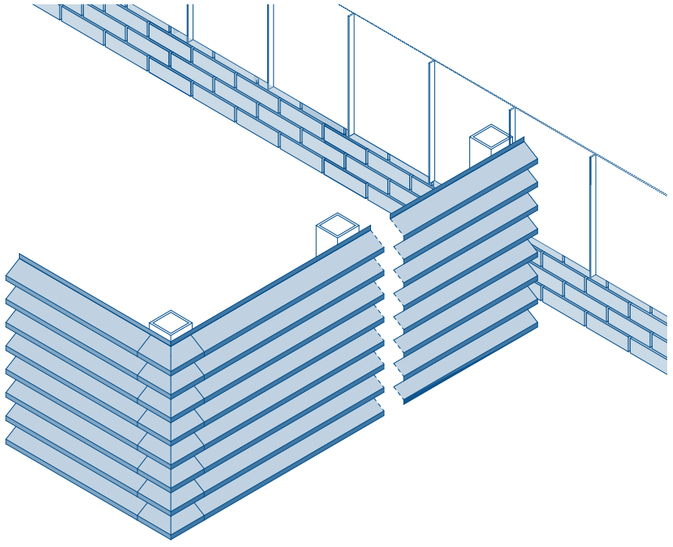
The standing seam zinc cladding will appear to wrap continuously over the roof ridge. There will be no additional ridge capping piece. It is important that the roof wrap is expressed as a simply detailed, continuous element to emphasise the barn form.

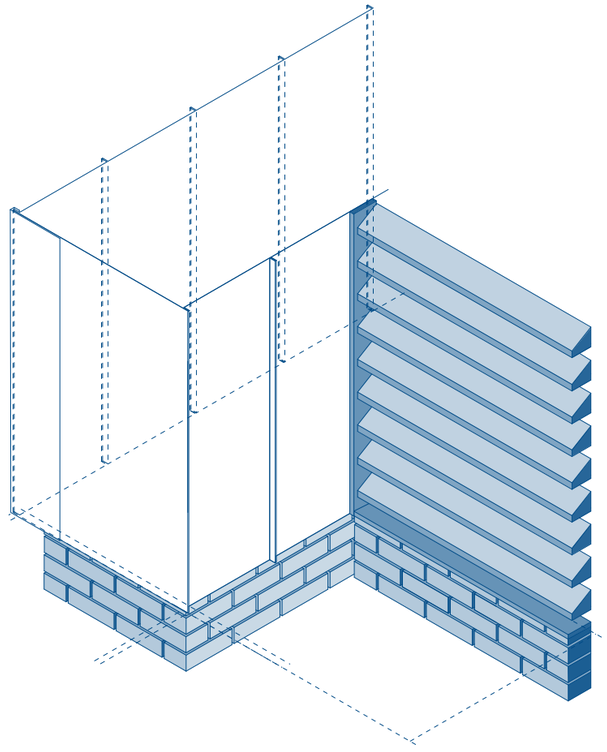


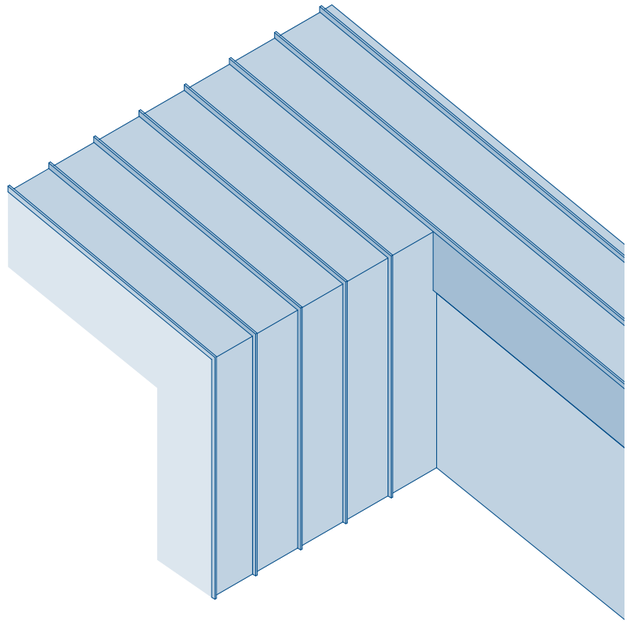
5.6.3 Zinc roof eave and gutter

The reveal depth at the end of the main Head Houses will be treated as an end piece to the larger volume. This has two detailed design implications. The final standing seam of the roof wrap will be at the edge of the roof and form the end profile of the roof wrap, the end profile of the roof wrap will join at the eaves and the ridge with a flat welt joint and otherwise be continuous.

The gutter will be concealed within the roof pitch and the standing seam wraps over the eaves and continues down the wall to help articulate the roof wrap as a simply detailed continuous element.







5.6.4 Louvered fence corner

The fence enclosure will have louvered corners and not a separate corner capping piece. A corner piece will be used and fitted into the straight horizontal louvres to ensure the louvres appear as continuous horizontal elements.

5.6.5 Brick plinth and recessed louvre

The brick plinth accommodate the dimensions of a full brick where possible. The louvered gable end is set within a slim steel frame and typically recessed by 1m from the zinc cladding.

5.6.6 Vent openings

The zinc will wrap down into the ventilation openings in the direction of the standing seams. The side walls of the ventilation openings will have the same profile of the roof-wrap at the gable ends of the building with an inset painted steel plate cladding to match the colour and finish of the louvered panels.

Access

5.7.1 Access strategy

Access to the site is via a permanent road off Chesham Lane, which enters the north side of the compound. The compound is surrounded by a security fence with barbed wire.

Alongside Chesham Lane, there is an errant vehicle ditch behind the hedgerow and this aligns with a secure vehicle gate on the access road into the site. In front of this gate there is an agricultural style timber gate and fence to assist in making the compound sit more sympathetically with its rural surroundings.

Various types of vehicles require access to the site and these are detailed on the opposite page. The size of the compound has been designed as efficiently as possible to accommodate the tracking of all vehicles requiring access to the site whilst minimising the overall compound footprint. Bollards are used within the compound to prevent vehicle damage to the various structures within the compound.

Opposite the main access into the compound, there is a gate to provide access to the infiltration basin for maintenance.

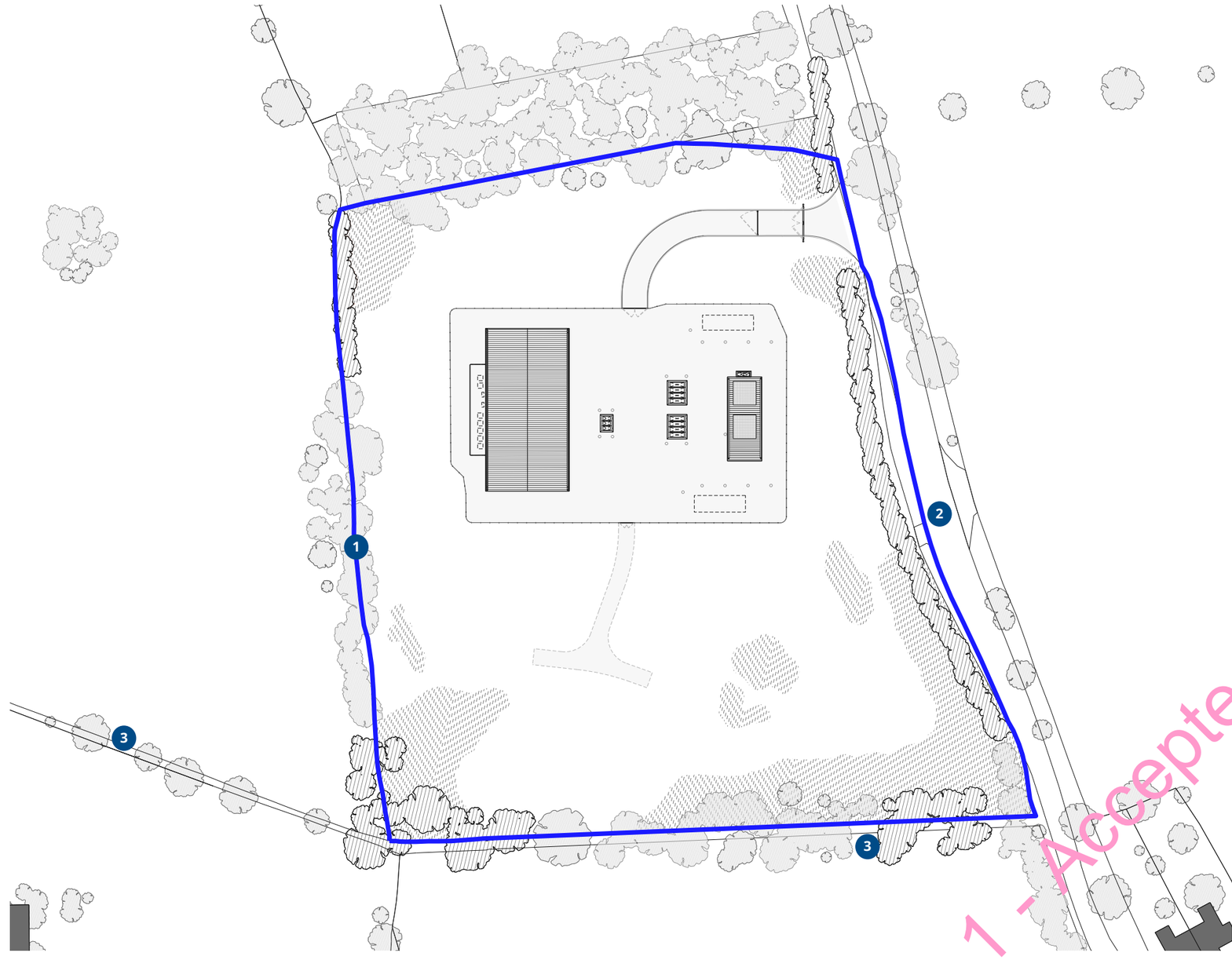
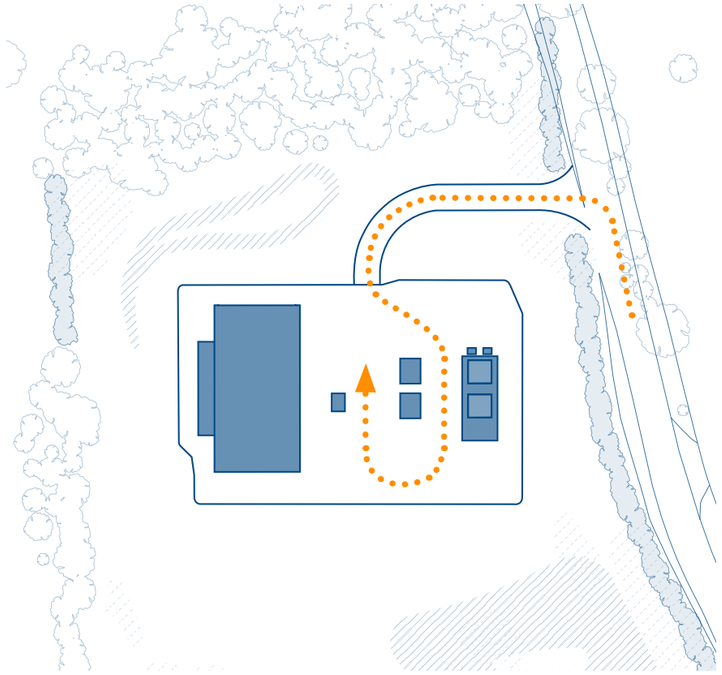


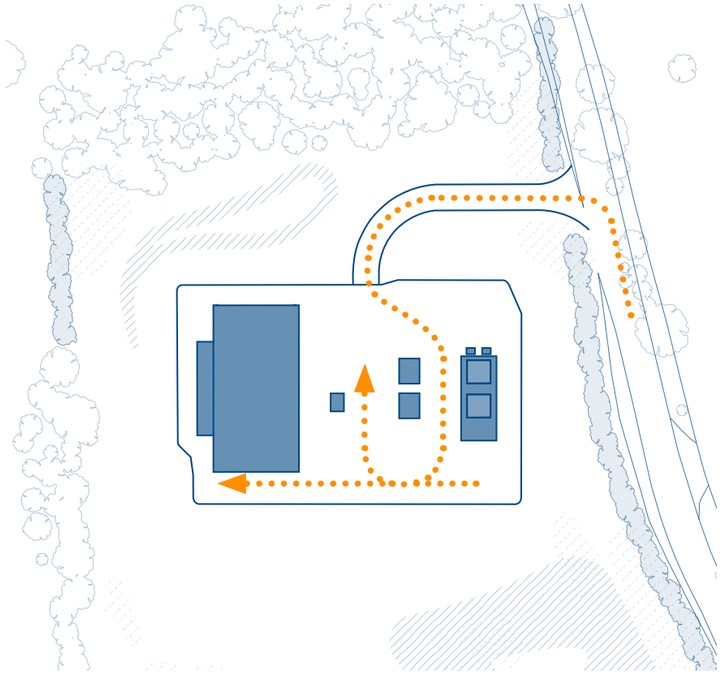
Fig.5.28_ Proposed site plan - Access strategy



5.7.2 16.5m Articulated vehicle tracking path

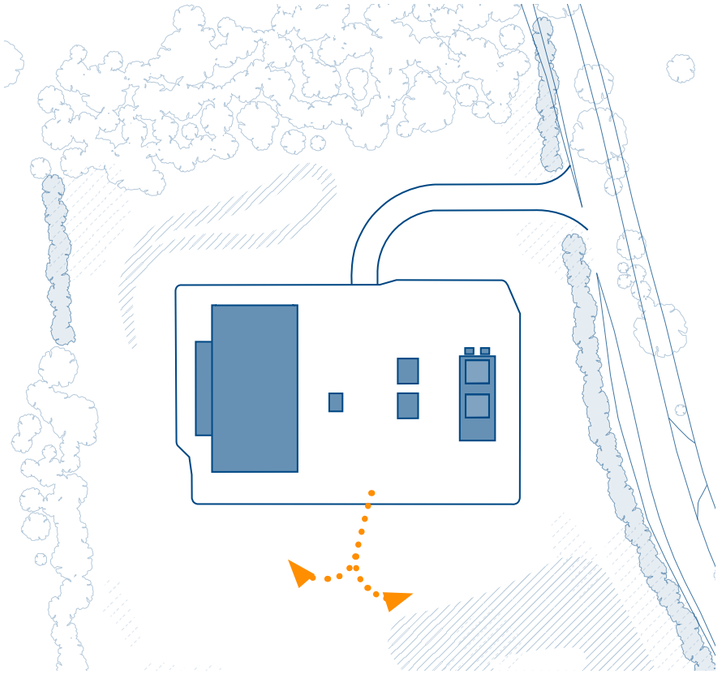
This worst-case FTA Design Articulated Vehicle (1998) was tracked left-turning into the access road from Chesham Lane and entering the compound. The vehicle then described a path around the building hatches to exit onto the access road without the need for a reversing manoeuvre.

The articulated vehicle tracking path is also used for mobile cranes. A 13.6m long Liebherr LTM 1100-5.1 mobile crane was tracked describing the movement above. This vehicle is expected to be required for very occasional replacement of major mechanical/electrical components.



5.7.3 10m Rigid vehicle tracking path

This vehicle followed the same track as the 16.5m articulated vehicle. An additional path down the western side of the main building was tracked to allow servicing of the welfare facilities. To exit this location, the vehicle would need to reverse most of the length of the compound prior to right turning back onto the access road.



5.7.4 4 x 4 Vehicle tracking path

The drainage pond will need to be periodically accessed for maintenance. A smaller vehicle was tracked leaving the compound from the south and using the hammerhead to turn around and return.

6.0
Landscape

A summary of the indicative landscape design proposals with reference to the overarching landscape vision and design considerations, covering habitat creation and management, access and recreation, water management, and the visitor experience.

Landscape Design

6.1.1 Introduction and overview

This chapter sets out the landscape design approach for Chalfont St Peter Ventilation Shaft. This includes broader components which are complementary to the planting and earthworks design, including ecological and habitat creation proposals, the overground drainage strategy and the landscape led site security strategy.

The proposals have been developed by a multi-disciplinary environmental team working in close collaboration with the architectural and engineering designs to ensure there is an integrated scheme which meets overarching HS2 design objectives, whilst delivering a landscape and ecological masterplan which is fundamentally responsive to its local context.

The proposals have been consulted on as part of the Schedule 17 pre-application process including several workshop events with the local planning authority (Bucks Council); the HS2 Chilterns AONB Review Group; and the HS2 Independent Design Review Panel. The design set out in this chapter should be read in conjunction with the accompanying landscape design drawing set, the indicative mitigation consultation and the Chalfont St Peter Schedule17 Restoration Proposals.

6.1.2 Design narrative

Chalfont St Peter Ventilation Shaft is the most southerly of the five ventilation shafts in Contract C1. Whilst each of the five sites are isolated in spatial terms, the landscape and ecological design narrative provides a unifying framework - based around HS2s Green Corridor concept - which allows expression of some common themes and ideas, with proposals adapted for each shaft site to respond to local conditions such as soils, community, planting typologies and landform.

Maximising biodiversity gain within the Chilterns AONB is the common thread which connects the five shaft sites. In conceptual terms, each site is considered to be a stepping stone through the AONB with each stepping stone creating a pocket of 'species rich' grassland habitat supported by native planting and other habitat features which are stitched into their local setting. These 'islands' of replicated habitat are continued at a much larger scale and with greater diversity into the more physically connected HS2 landscapes within the Colne Valley.

The following sections expand upon this concept and in particular explain the strategic relevance of the biodiversity focussed approach and narrative.

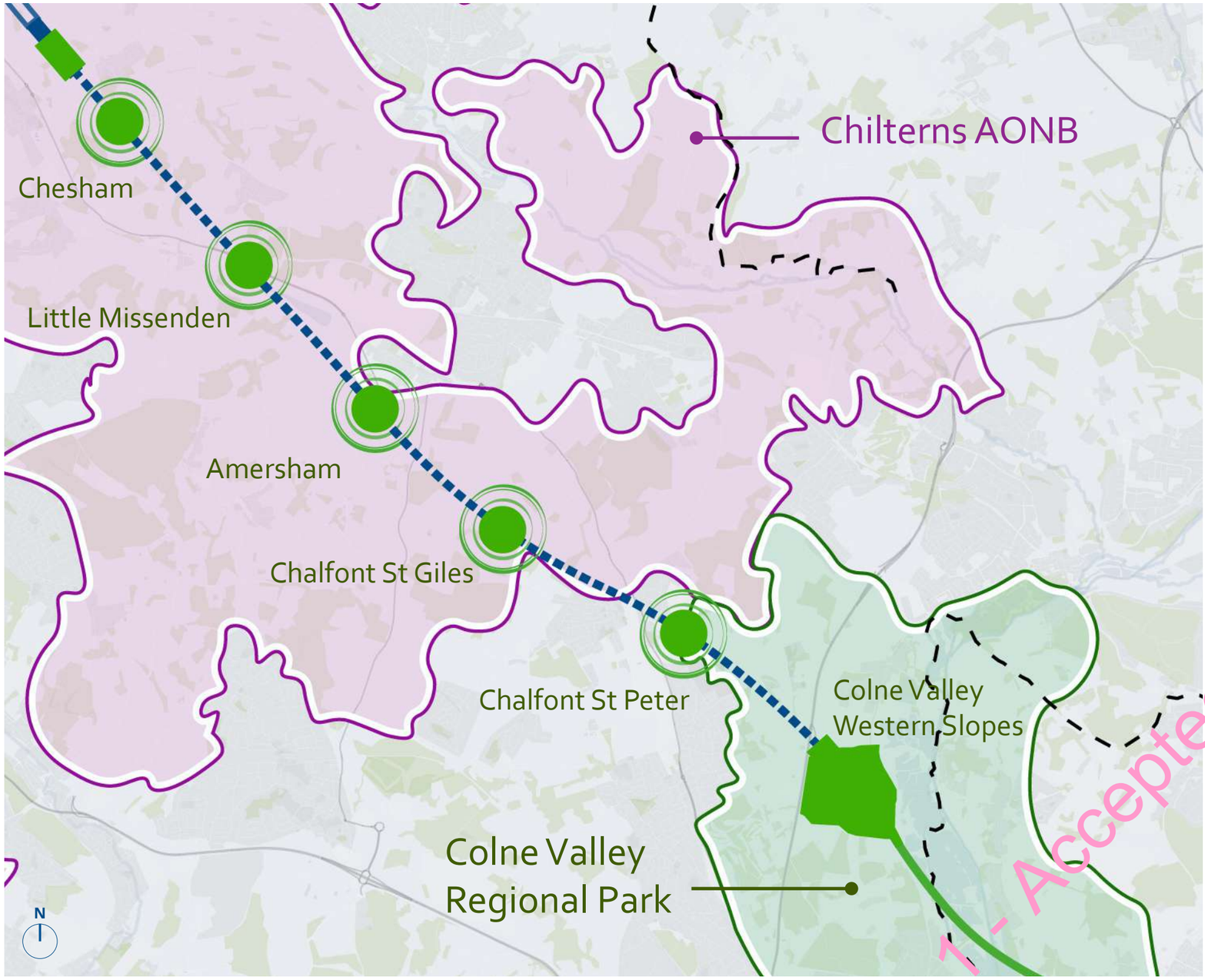


Fig.6.1_ Ecological Stepping Stones concept

"A chain of 'ecological stepping stones', part of HS2's Green Corridor threading lightly through the Chilterns – each site a small but rich space for biodiversity, shaped by context and woven into the natural landscape.

These are quiet spaces, revealing slow shifts in colour and texture; people pass and pause briefly, curiosity stirred by subtle clues that hint at the drama of the railway which charges beneath their feet."

6.1.3 Design principles

A set of high level landscape and ecological design principles have been developed for the five shaft sites. These are framed within overarching narrative of biodiversity optimisation within the context of the Chilterns AONB and cover key topics and themes which are common considerations at each of the sites. The table to the right sets out the six principles and describes the high-level design response.

This framework is however sufficiently flexibility to allow the crafting of a 'local' design response for each location and this is expanded on in the following section of this chapter.

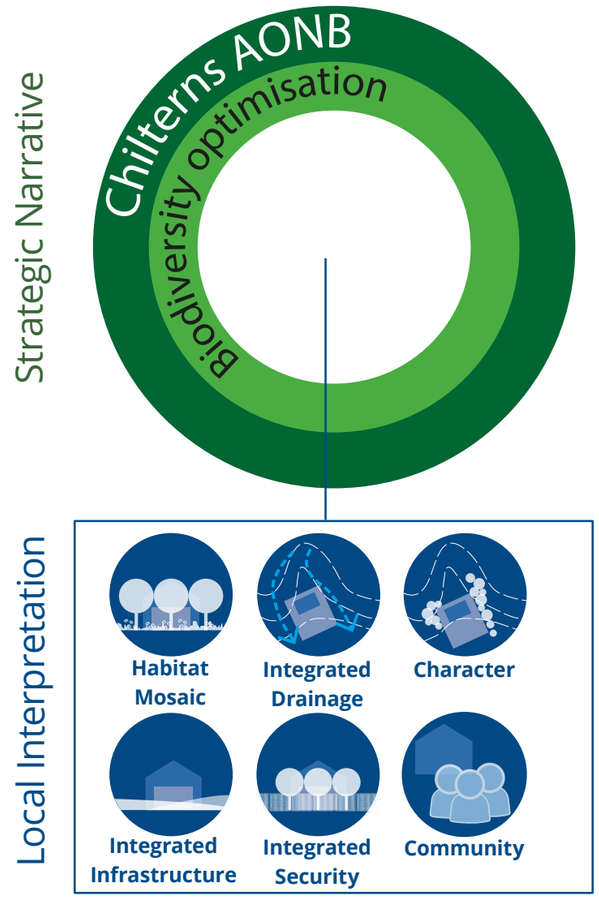


Fig.6.2_ Design principles

Principle	Design Response
Habitat Mosaic	Maximise biodiversity value through establishment of a connected and 'contextually appropriate' habitat mosaic - seeking opportunity to create (with appropriate aftercare) scarce and/ or locally important landscapes.
Character	Respond positively and sympathetically to site character as applicable at the local level including response to landform; soils and geology; planting character; and cultural and heritage features.
Integrated Drainage	Design efficient and integrated drainage systems which respond to natural hydrological and hydro-geological processes as far as practicable and which conform with standards and guidelines.
Integrated Infrastructure	Use landscape features to sensitively integrate buildings, boundaries and access roads within their contextual setting – this includes curation of screening and opening of views depending on context and purpose.
Integrated Security	Design a proportionate security response which is landscape led and as conspicuous as possible.
Community	Where appropriate, and not conflicting with operational/ security considerations, facilitate forms of public interaction and engagement with the site.

Masterplan

6.2.1 Chalfont St Peters Landscape Masterplan

The landscape masterplan for Chalfont St Peters is informed in its broader sense by its setting on the edge of the Chilterns AONB, and at a more local level by the interfaces with the neighbouring pastoral landscape, its dispersed communities and its proximity to rights of way and the local road network.

The site, prior to the commencement of construction works was typical of the surrounding mosaic of small to medium sized fields, bound by native tree belts and hedgerows - much of it used as pastoral land and for equestrian grazing and paddocks. The retention of much of the field boundary establishes a physical and visual containment which is largely maintained in the masterplan proposals. The gently sloping topography is equally typical of the local landscape and much thought has been given to landform to ensure that the essence of this is maintained for both visual and drainage purposes.

From a habitat and biodiversity perspective, the masterplan utilises (and expands) the retained boundaries of mature tree and scrub cover; and equally develops further complexity/ diversity reflecting the early works biodiversity scheme to the immediate north west which has established new wetland and grassland habitat.

The principal components of the masterplan are set out in Figure 6.3 and Figure 6.4 opposite. An assessment of the key design elements follows in the subsequent sections.

Fig.6.3_ Photographs - Site images

Fig.6.4_ Landscape Masterplan

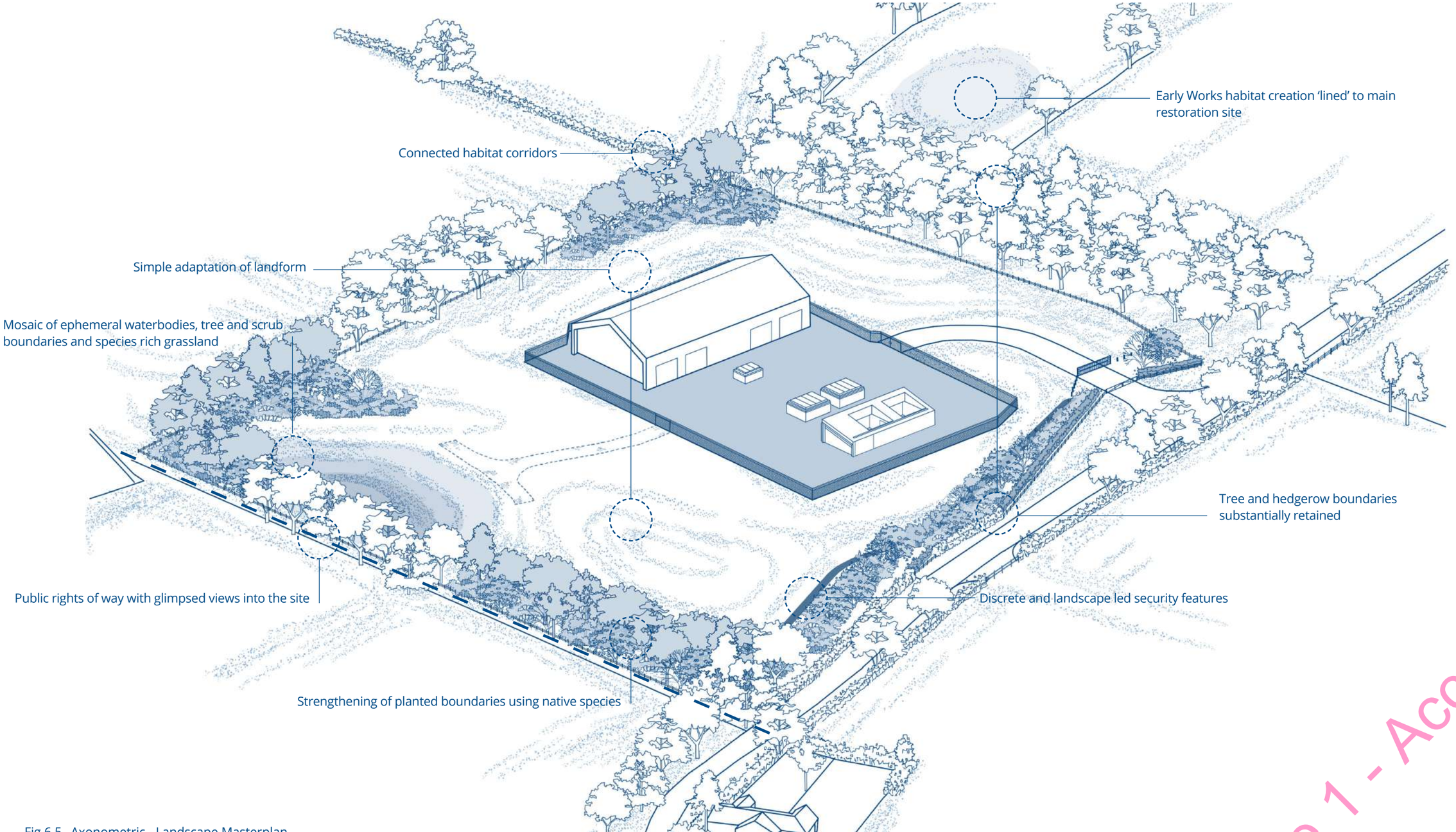


Fig.6.5_ Axonometric - Landscape Masterplan

Habitat Creation and Optimisation

6.3.1 Overview

The landscape design will maximise biodiversity value through establishment of a connected and contextually appropriate habitat mosaic, seeking opportunities to create a locally important landscape. Habitats will be created and managed within the site to reflect and enhance the existing landscape and ecological character of the Chilterns Hills.

New habitats will be connected to existing semi-natural habitats in the surrounding landscape to enable organisms to disperse into and out of the site. The site is intended to be one of five 'stepping stones' of wildlife habitat, provided through similar habitat creation at each of the other shaft sites along the Chiltern Tunnel at Chalfont Saint Giles, Amersham, Little Missenden and Chesham.

6.3.2 Objectives/ Principles

The overall target is establishment of habitats that conform with the priority habitat types listed on Section 41 of the NERC Act 2006. The site is intended to be a small but diverse and functional mosaic of semi-natural habitats, providing multiple benefits for wildlife and landscape. Habitats will be varied in structure and function to enable them to achieve their biodiversity potential for as wide a range of flora and fauna as possible. Although a relatively small area, the proposed habitat creation within the site contributes toward the HS2 No Net Loss (NNL) commitment and follows Code of Construction Practice and other related requirements such as BREEAM.

Fig.6.6_ Pipistrelle bat (target species)

6.3.3 Maximising opportunities for habitat creation

The key habitats that will be targeted are wildflower and invertebrate-rich neutral grassland, and boundary woodland and scrub planting. Habitat creation opportunities will focus on:

- Creation of species-rich grassland, informed by soil and substrate reflective of Chilterns grasslands;
- Gap-planting including grading tree/scrub planting into irregular diverse margins, providing transitional 'edge' habitats;
- Planting of a new/ replacement hedge along the eastern site boundary - set back from its original alignment (to improve sight-lines and management issues);
- Retention of mature trees as key habitat within field boundaries; and
- Habitat features such as reptile/amphibian hibernacula, basking banks, bat and bird boxes - providing a resource to targeted species or species groups.

Fig.6.7_ Grass Snake (Target species)

Fig.6.8_ Species Rich Grassland (target habitat)

Fig.6.9_ Woodland edge (target habitat)

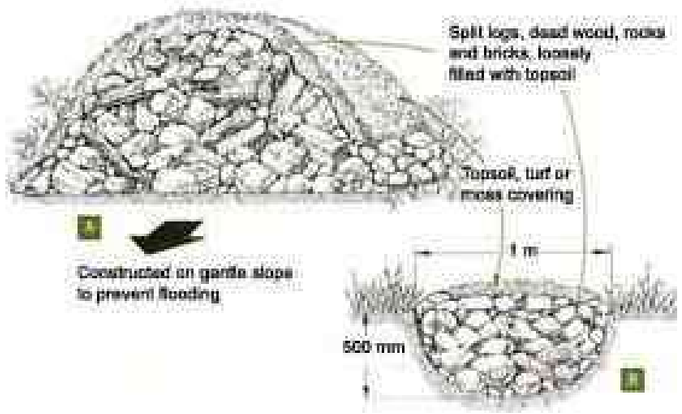


Fig.6.10_ HIbernaculum (illustrative detail)

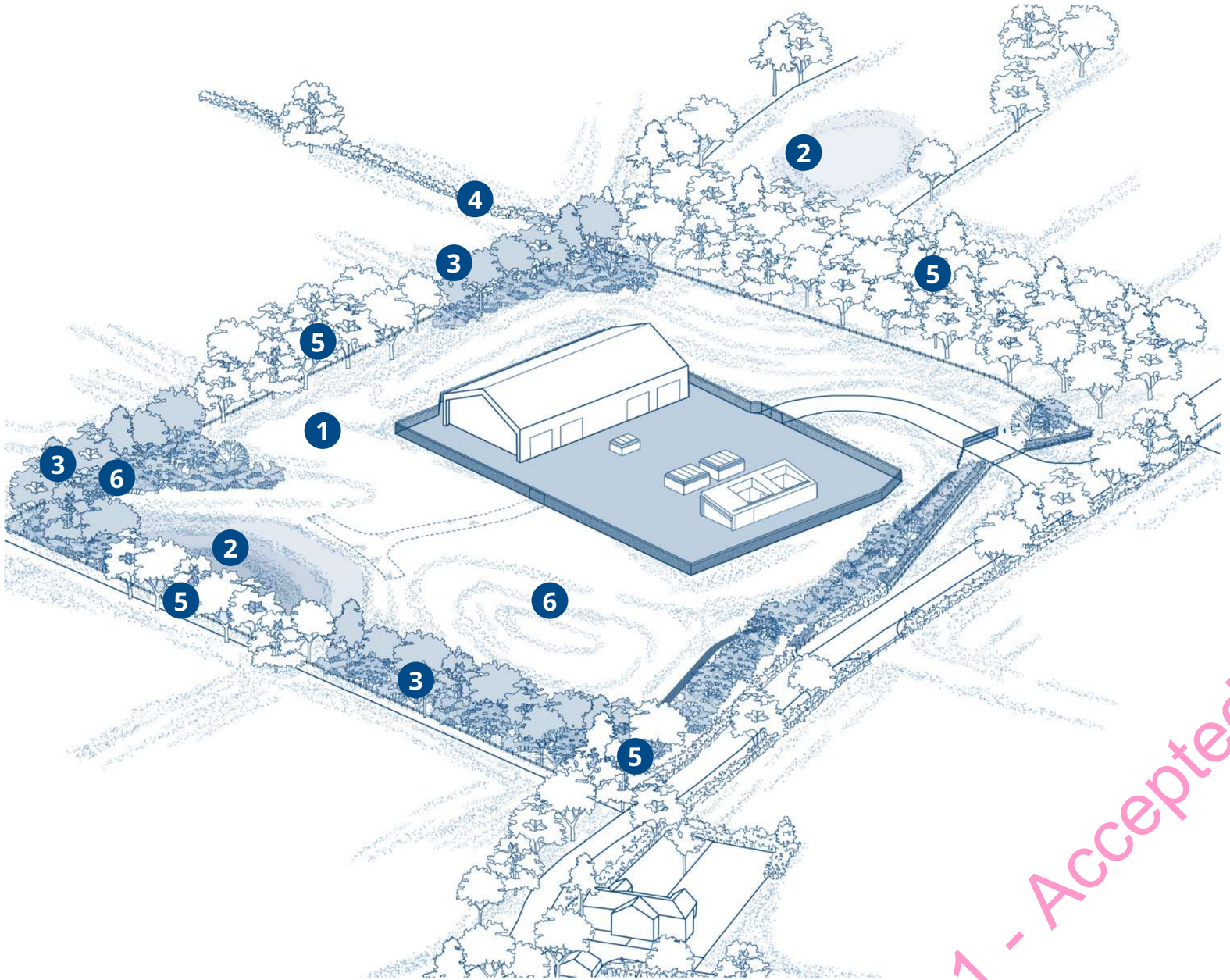


Fig.6.11_ Axonometric

Key

1. Creation of species rich grassland habitat informed by soil and substrate – reflective of Chilterns grassland.
2. New wetland habitat and ephemeral water bodies to diversify habitat mosaic.
3. Gap planting including grading tree/scrub planting into irregular diverse margins.
4. Better integrations with wider habitat corridors – foraging and movement corridors.
5. Retention of mature trees as key habitat within field boundaries.
6. Incorporation of incidental habitat features – hibernacula (see Figure 6.10), basking banks, bat and bird boxes etc.

Habitat Creation and Optimisation

6.3.4 Habitat management and establishment

Developing a comprehensive landscape design, fully integrated with ecological design, is only the first step to creating extensive areas of new and restored habitat that merges seamlessly into the existing landscapes. To achieve the desired high-quality habitats, clear principles will be established, to be applied during the construction and future management phases of the scheme. This will be critical to maximising the ecological potential of the new and restored habitats.

6.3.5 General principles

General principles to ensure effective construction and establishment of new habitats, will include:

- Designs will minimise future maintenance as far as possible. Future maintenance will be planned on a rotational basis, so that the extent of ecological damage to newly established habitats is minimised.
- A Site-Specific Environmental Management Plan (SS-EMP) will be in place, identifying all sensitive environmental features, and clearly detailing mitigation/ compensation necessary to avoid impacts/ ensure no net loss.
- Timing of the construction works, and future management will be planned to minimise ecological impacts to new habitats and the species they support. Autumn is often the best time for maintenance work since least disturbance to wildlife will be caused at this time of year.
- The use of artificial lighting during the construction work will be avoided/ minimised to avoid disturbance to bat populations.
- An Ecological Clerk of Works (ECoW) will be appointed to assess the need for ecological supervision of the various component parts of the scheme, and to oversee any works in sensitive areas.

Habitat type	Construction	Management
Species-rich neutral grassland 	Soils required for grassland planting areas will be made up from stripped/ retained low-fertility subsoil arising from within the site itself. No additional soils will be imported. Seed mixes will be planted directly onto the low-fertility subsoil layer, which will result in less growth of coarse grass species and a greater diversity of flowering plants due to reduced competition.	Grassland habitats are likely to be managed by cutting/mowing, which will aim to maintain and support the development of a structurally complex, flower-rich and species-rich sward. This will include shorter and longer areas of grass, and scrub of various ages and extents, to create complex edges and micro habitats for a diversity of invertebrates. Arisings will be removed to reduce nutrients within the soil and encourage flowering plants to thrive. Management shall be required to prevent weeds or early grasses from suppressing the flowers.
Hedgerow, woodland, scrub and woodland edge/ scrub planting 	Hedgerow and woodland reinstatement planting and enhancement planting will take place around the site boundaries. Excess topsoil removed from grassland areas will be used in areas of hedgerow, woodland and scrub planting. Planting will aim to replicate the species composition of woodland and scrub in the local area. The planting mix will also include a small number of fruiting shrubs and trees to add diversity. Layout of planting will replicate a natural landscape, ensuring spacings and patterns of planting are random rather than uniform.	Rabbit fences or guards will be provided and maintained whilst plants become established. They will be removed once plants are less sensitive to attack by animals. Planted trees and shrubs will be maintained to ensure their long-term survival and development of wooded habitats. This will comprise checks for tree mortality and replacement of dead plants, and watering and weeding as required. Fallen trees and standing deadwood will be retained where possible to maximise biodiversity of new woodlands.
Micro habitats for protected species 	Reptile basking banks, hibernacula and a grass snake egg-laying heap will be installed during the habitat creation phase. Bat and bird boxes (including barn owl nesting box) will be installed in mature trees around the site margins. If available following site clearance, any dead wood, coppice stools and saplings will be salvaged and re-used in created woodland to provide additional habitat.	Habitat features will be subject to annual checks to control and dense growth of invasive plants and to cut back vegetation growth to maintain open south-facing sides of basking banks and the hibernaculum and to assess condition and make repairs as required. A licensed bat ecologist will inspect and maintain boxes at least once a year to ensure that they do not fill with material or become blocked. Bird nest boxes will be subject to annual checks and maintenance.

6.3.6 Planting and seeding schedules

Planting Schedule

Species Schedule		Woodland Mix	Woodland Edge and Scrub Mix	Hedgerow
Acer campestre	Field maple	x		x
Carpinus betulus	Hornbeam	x		
Cornus sanguinea	Dogwood		x	x
Corylus avellana	Hazel	x	x	x
Crataegus monogyna	Hawthorn	x	x	x
Euonymus europaeus	Spindle		x	x
Fagus sylvatica	Beech	x		
Ilex aquifolium	Holly	x	x	
Ligustrum vulgare	Common privet		x	x
Lonicera periclymenum	Honeysuckle			x
Malus sylvestris	Crab apple		x	x
Prunus avium	Wild Cherry	x	x	
Prunus spinosa	Blackthorn		x	
Rhamnus cathartica	Purging buckthorn		x	
Rosa canina	Dog rose		x	x
Rosa rubiginosa	Sweet briar		x	x
Quercus robur	Common Oak	x		
Salix caprea	Goat willow		x	
Sambucus nigra	Elder	x	x	x
Sorbus aucuparia	Rowan	x		
Taxus baccata	Yew	x		
Tilia cordata	Small-leaved lime	x		
Viburnum opulus	Guelder rose		x	

Planted as transplants and feathers (25% of Oak and Beech as feathers); planted areas undersown with shade tolerant grass mix.

Seeding Schedule

Grassland species	Wet	Species Rich	Shady
Achillea millefolium	x	x	x
Achillea ptarmica	x		
Agrimonia eupatoria			x
Agrostis capillaris	x	x	x
Alliaria petiolata			x
Alopecurus pratensis	x		
Anthoxantheum odoratum	x		x
Betonica officinalis	x		
Brachypodium sylvaticum			x
Briza media	x		
Centaurea nigra	x	x	x
Clinopodium vulgare			x
Cynosurus cristatus	x	x	x
Deschampsia cespitosa	x		x
Digitalis purpurea			x
Festuca rubra	x	x	x
Festuca rubra juncea			
Filipendula ulmaria	x		
Galium mollugo			x
Gallum verum	x	x	
Geum urbanum			x
Geum rivale	x		
Hordeum secalinum	x		
Hypericum perforatum			x
Leucanthemum vulgare	x	x	x
Lotus pedunculatus	x		
Lotus corniculatus		x	

Seeding Schedule (continued)

Grassland species	Wet	Species Rich	Shady
Phleum bertollini		x	
Plantago lanceolata	x	x	x
Plantago media		x	
Poa nemoralis			x
Primula veris	x		x
Primula vulgaris	x		x
Prunella vulgaris	x		x
Ranuncula acris	x	x	
Rhianthus minor	x	x	
Rumex acetosa	x	x	
Sangulsorba officinalis	x		
Schedonorus pratensis	x		
Silene dioica			x
Silene flos-cuculi	x		
Stachys officinalis			x
Succissa pratensis	x		
Torilis japonica			x
Trifolium pratense	x	x	x
Vicia cracca	x		x
Viola cracca			
Vicia sativa ssp. segetalis			x

Landscape Character

6.4.1 Overview

The design principles set out a requirement to restore the site(s) in a manner which responds to key character drivers. In the case of Chalfont St Peter the components of character which are most relevant include:

- Sympathetic ground modelling to retain broad topographical character – whilst retaining a proportion of excavated materials on site to meet sustainability objectives.
- Retention and strengthening of linear vegetated boundaries – reflecting local pattern of open fields and vegetated enclosure.
- Maintaining as far as practicable the historic agricultural setting of Ashwell Farm (Listed Building).
- Consideration of more distant views and how site 'stitches ' back into its setting of the Chilterns AONB.

These are discussed in more detail in the following section.

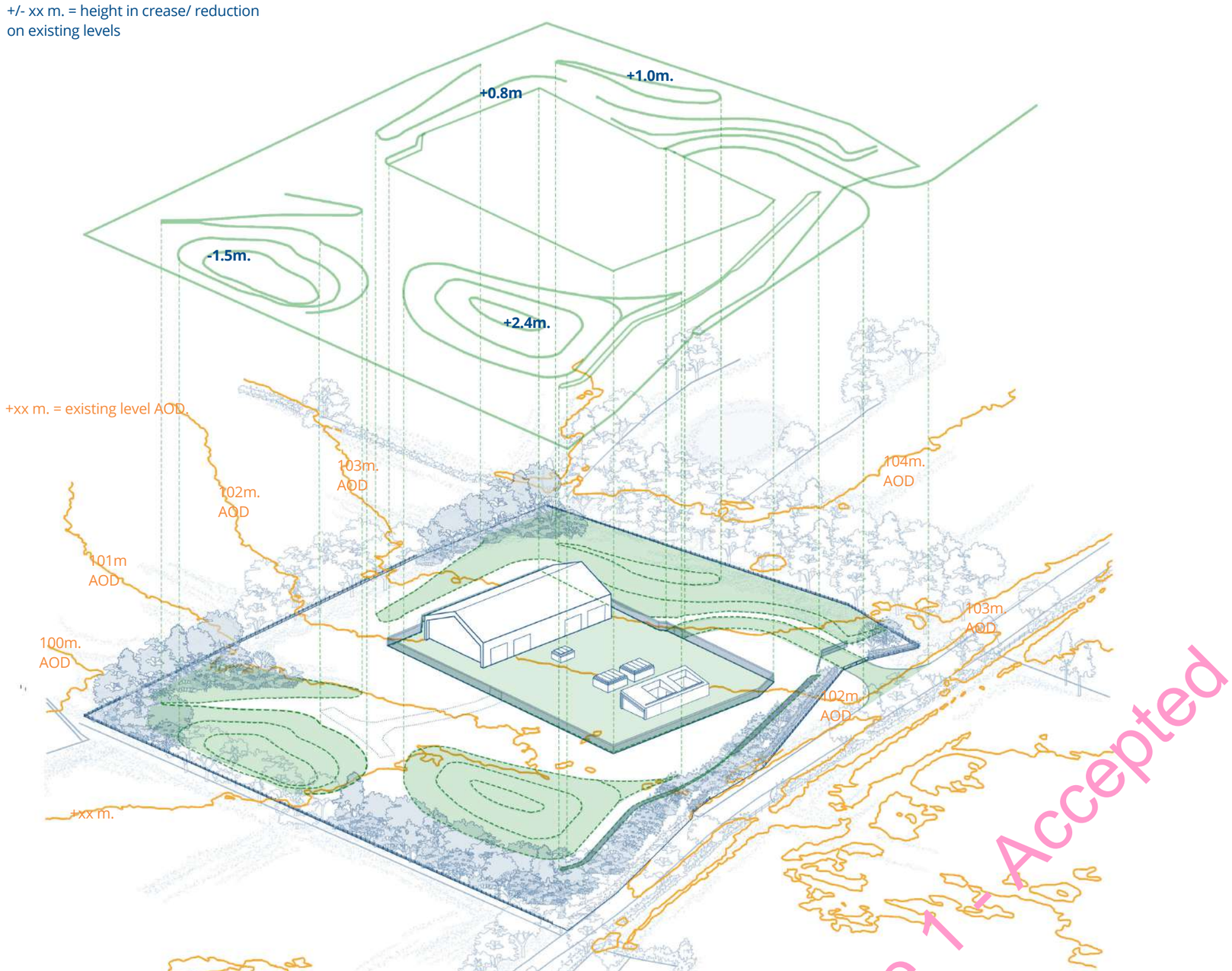


Fig.6.12_ Proposed ground model

6.4.2 Topography

The site itself if typified by flat/ gently sloping ground which is perched above the Misbourne valley. The generation of excess spoil material from the shaft and basement/ compound means that there is the potential to accommodate some fill within the restored site - however this must be balanced against the creation of incongruous earth forms which would not be in keeping, or in scale, with its setting.

The impact of raising the ground above existing levels has been tested and a design developed which provides some opportunity to accommodate excess fill (which is commensurate with the scale/ capacity of the site) whilst maintaining a sense of a relatively uniform topography. The landform model has also been designed to create flow paths for surface water drainage - which according to HS2 Standards should be contained within separate conveyancing and discharge systems to water which is part of the track (or in this case shaft) infrastructure (refer to the drainage chapter for details).

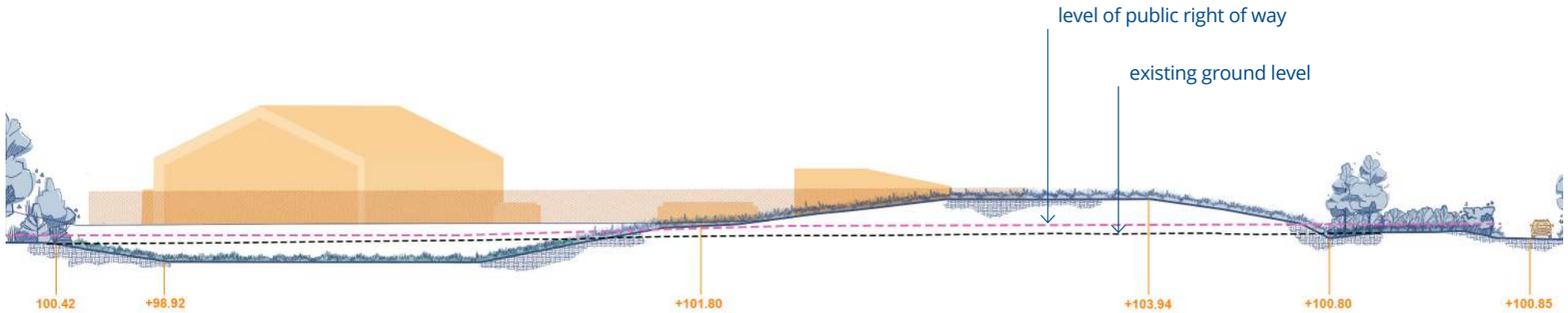
The level change to accommodate an acceptable amount of spoil material is largely concentrated within the south east area of the site. Here land rises no greater than c.1.5m above current ground level to create a very shallow mound. This feature helps, in part, to deflect views from the public right of way on the southern boundary and provides some low level screening (in combination with seeding and planting) of the secure fence line, which wraps around the compound, and any low level infrastructure.

Within the south west area a shallow depression (c. 1.5m below existing ground level) will be created to accommodate the outfalls from the shaft drainage (connected by below-ground pipework). Boreholes are set within the basin and the ground seeded with a grass mix which is tolerant of very occasional water inundation. This will serve as an infiltration basin only so the ground will be seeded with a grass mix which is tolerant of very occasional water inundation. In most conditions the basin will be dry

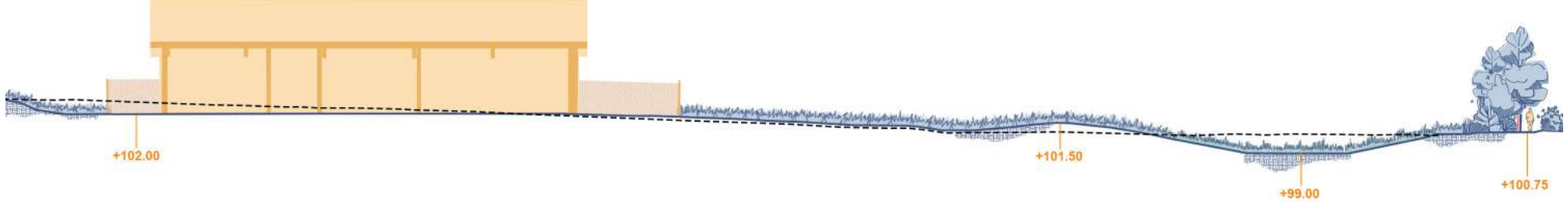
On the eastern boundary a shallow ditch feature will be created to form part of the secure site boundary.

Finally very low earth mounds (between 0.3m and 1.0m above existing levels will be created around the north west and northern areas of the compound and once seeded will be largely indiscernible. Their function is to guide overland water flows away from the compound slab and buildings

The nature of the most substantial level changes is illustrated in Figure 6.13.

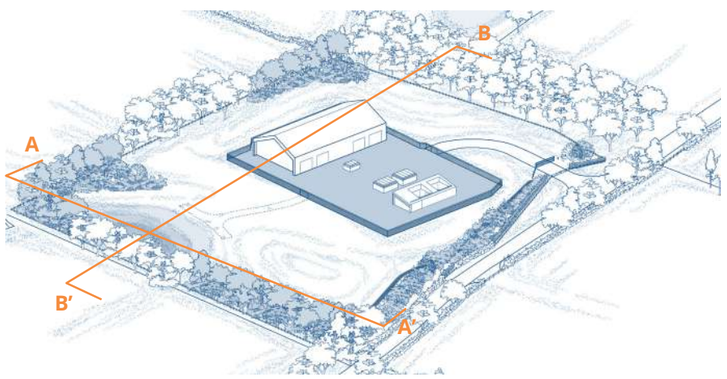


Section A-A'



Section B-B'

Fig.6.13_ Proposed site sections



6.4.3 Accessibility and community

The primary design objective for the site is to optimise the biodiversity through establishment of appropriate flora and provision of suitable habitat. This approach is substantially predicated on restricting formal public access to the perimeter of the site on existing rights of way and thus avoids disturbance to habitats and plant communities in what is a relatively small area. The site is also sensitive from a security perspective and therefore not well-suited to unmanaged public use.

However, there are simple ways in which the public and local community will be able to interact. The creation of 'windows' into the site from the footpath can be achieved by leaving gaps in planting or specifying low growing species in specific locations. This will not dilute the broader approach which is to create a vegetated 'wrap' around the site.

Opportunities for forms of remote interaction (digital content for example which could be accessed in the field by walkers); or occasional study visits to observe wildlife could be a future HS2 project that could exist outside of the main design stage/ process.

Any future uses should however be guided by consultation to assess need and benefit and not made on the basis of assumptions.

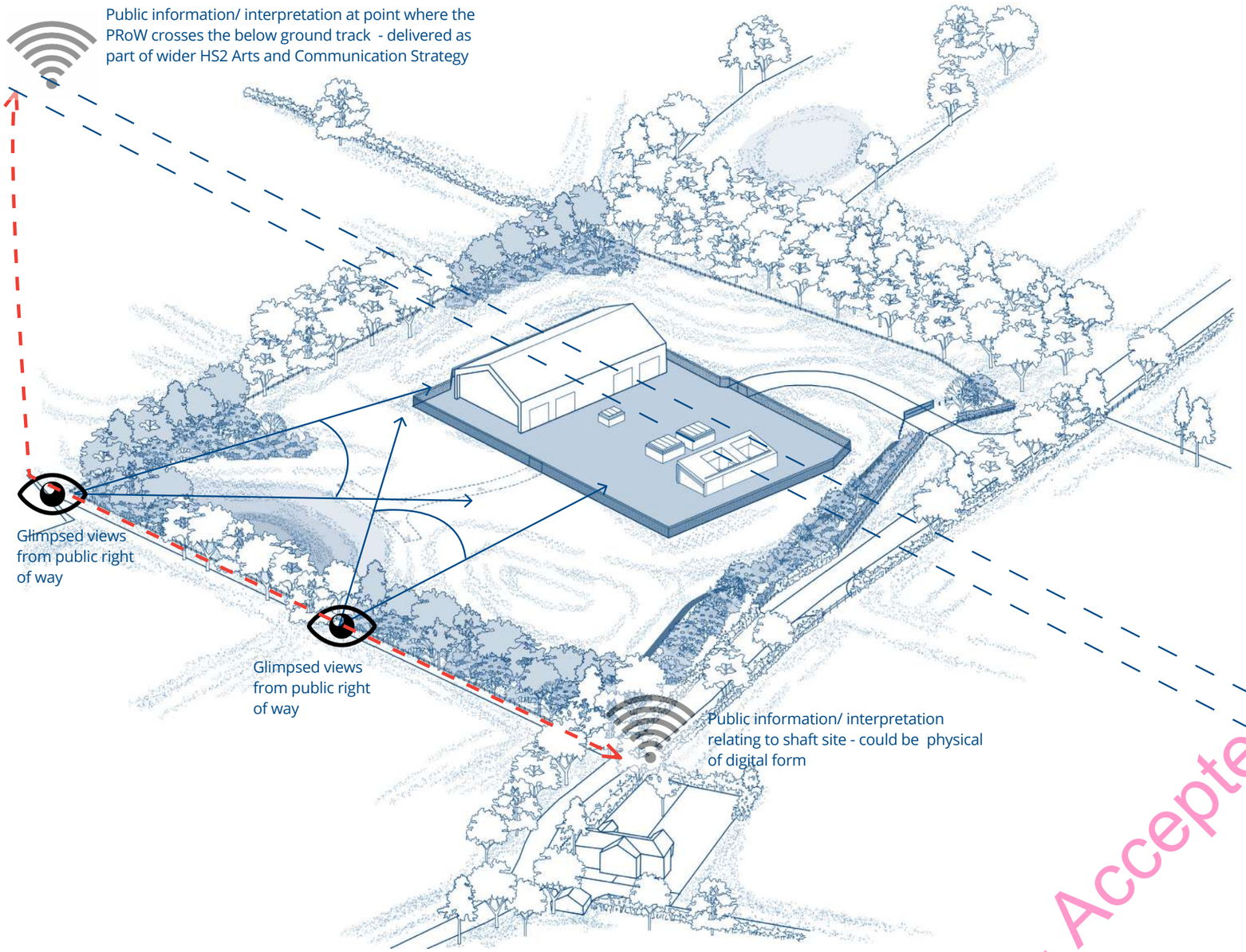


Fig.6.14_ Access and interaction

Site Security

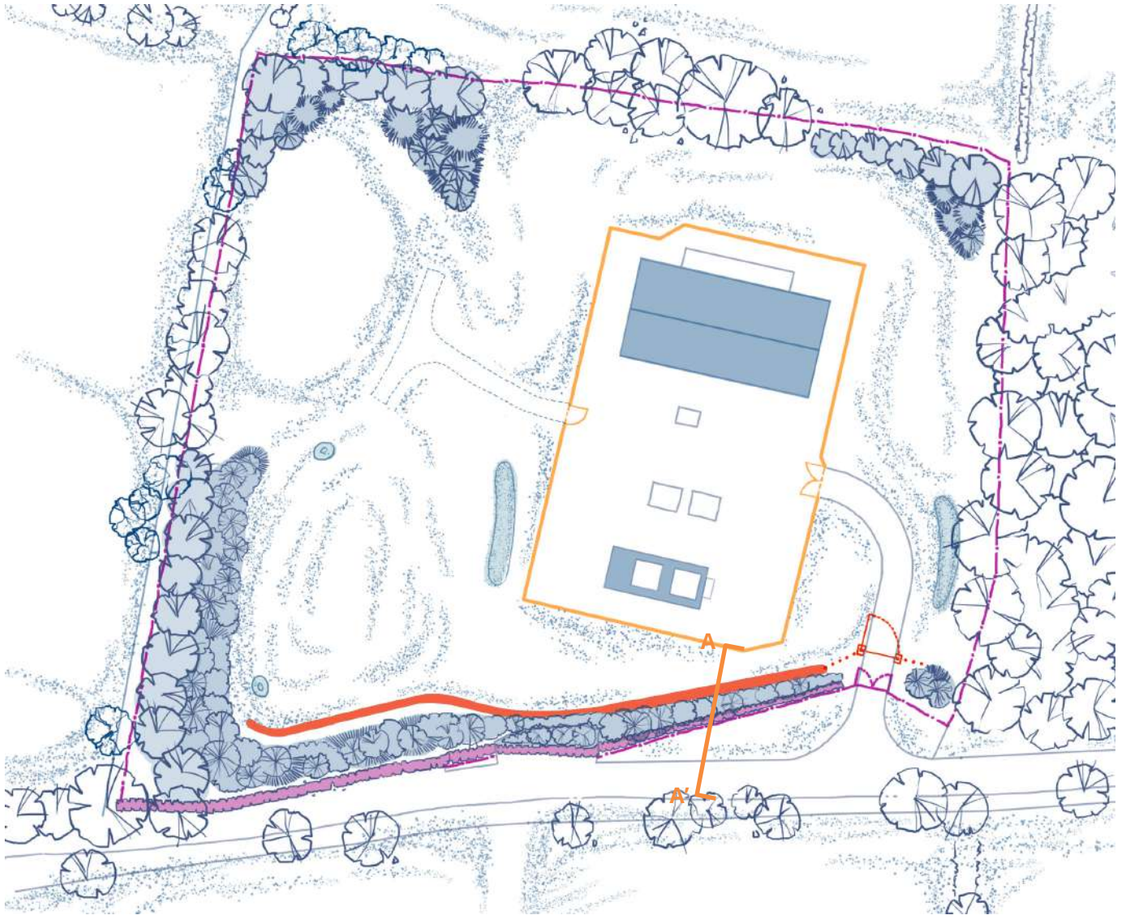
6.5

6.5.1 Security strategy

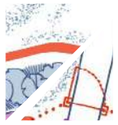
HS2 facilities need to have adequate security, which meets the HS2 security requirements. The main elements of the security design include:

- A high level of protection around the compound and ventilation infrastructure - including unauthorised access from pedestrians and vehicles;
- Secure fencing around the compound to prevent public access to the site - whist allowing access for maintenance purposes;
- Gated access from the junction with Chesham Lane which, in part is to prevent unauthorised vehicle access to the compound, and also to deter fly-tipping; and
- Site boundary fencing which serves to delineate ownership boundaries and does not provide any security function.

The design approach aims to integrate the different levels of security in a manner which is as recessive as possible and largely landscape led. This comprises the features which are set out in Figure 6.15.



Compound Edge – Black weld mesh fencing with three strands of barbed wire



Vehicle HVM Line – Earthworks to prevent unauthorised vehicle access behind hedge line, and entrance gates

Site Boundary – Post and wire, timber gate & hedging

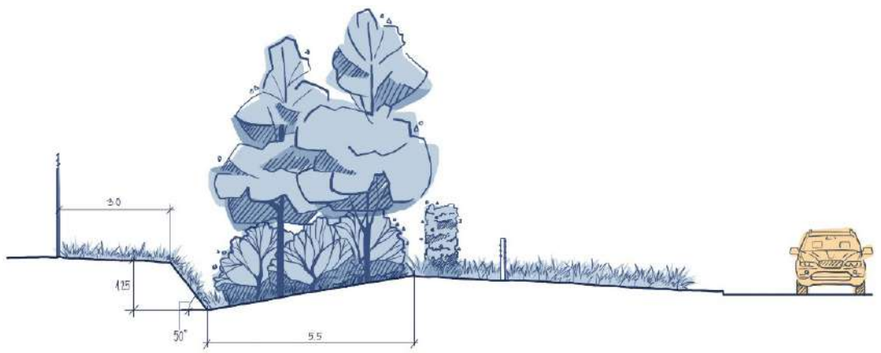


Fig.6.15_ Proposed site security and boundary treatment

Highways

6.6

6.6.1 Highways infrastructure

The single vehicle access into the site has been designed to a minimum width to allow planned vehicle access for maintenance purposes. This road is equivalent to the dimensions of Chesham Lane and would be an asphalt construction. Grassed verges to either side will be allowed to grow 'tall' to help to integrate the road within its field setting.

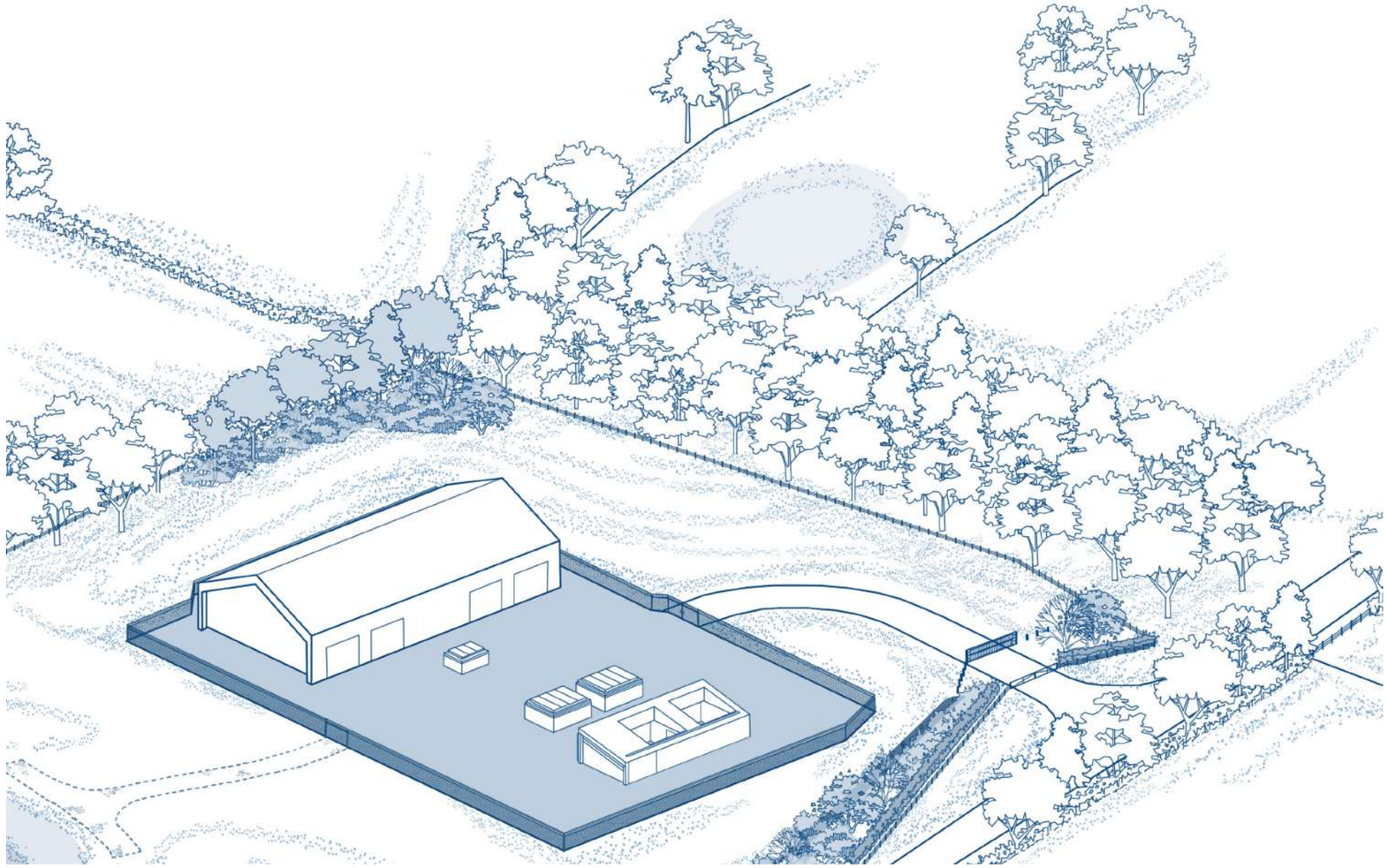
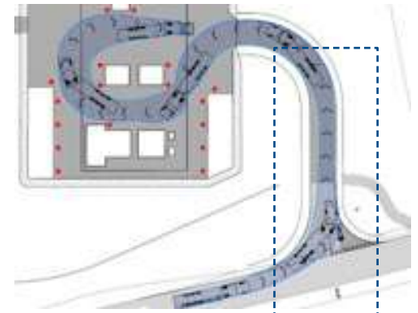


Fig.6.16_ Access road general arrangement



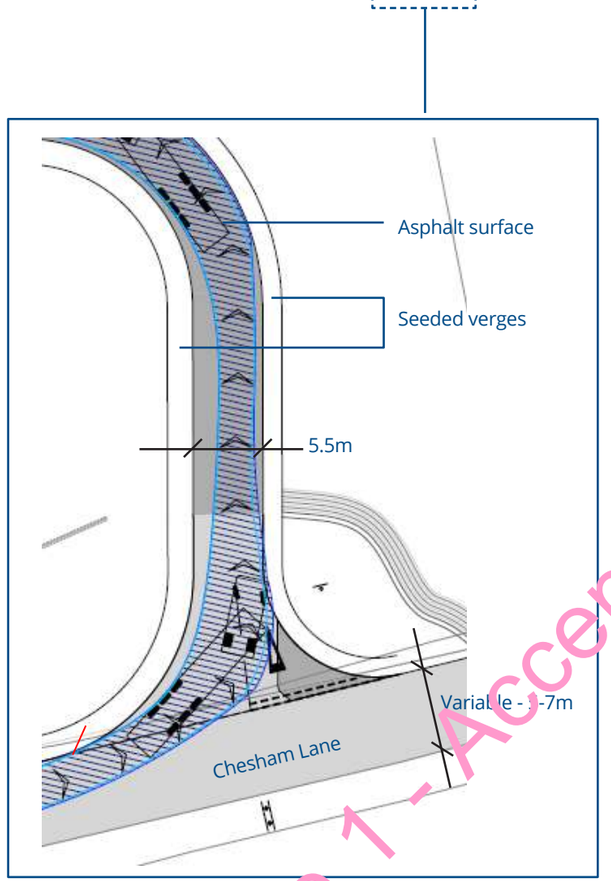


Fig.6.17_ Access road key dimensions and swept path

Drainage

6.7

6.7.1 Drainage infrastructure

The drainage strategy for the shaft site is based upon two separate systems to (i) capture and convey overground flows from adjacent land and greenfield areas within the site; and (ii) a separate system to deal with rainfall which is captured within the compound.

The perimeter drainage ditch captures runoff from external catchments (in this case mostly fields and woodland) and directs it around the compound to prevent flooding of the HS2 compound and to avoid any pollutant from outside entering their land. The drainage within the curtilage is clearly required to intercept, convey and treat runoff generated by HS2 itself. Separation of runoff from outside and inside the curtilage is a standard approach for all development.

Figure 6.18 illustrates the general principles of the site drainage whcih comprises:

Landscape Drainage – Subtle use of landscape earthworks to 'push' and channel landscape run off around the compound and back into the surrounding natural drainage pattern.

Railway Drainage – Water falling in the compound is directed to the perimeter filter drains, which is then piped to a basin, where it is infiltrated into the ground.

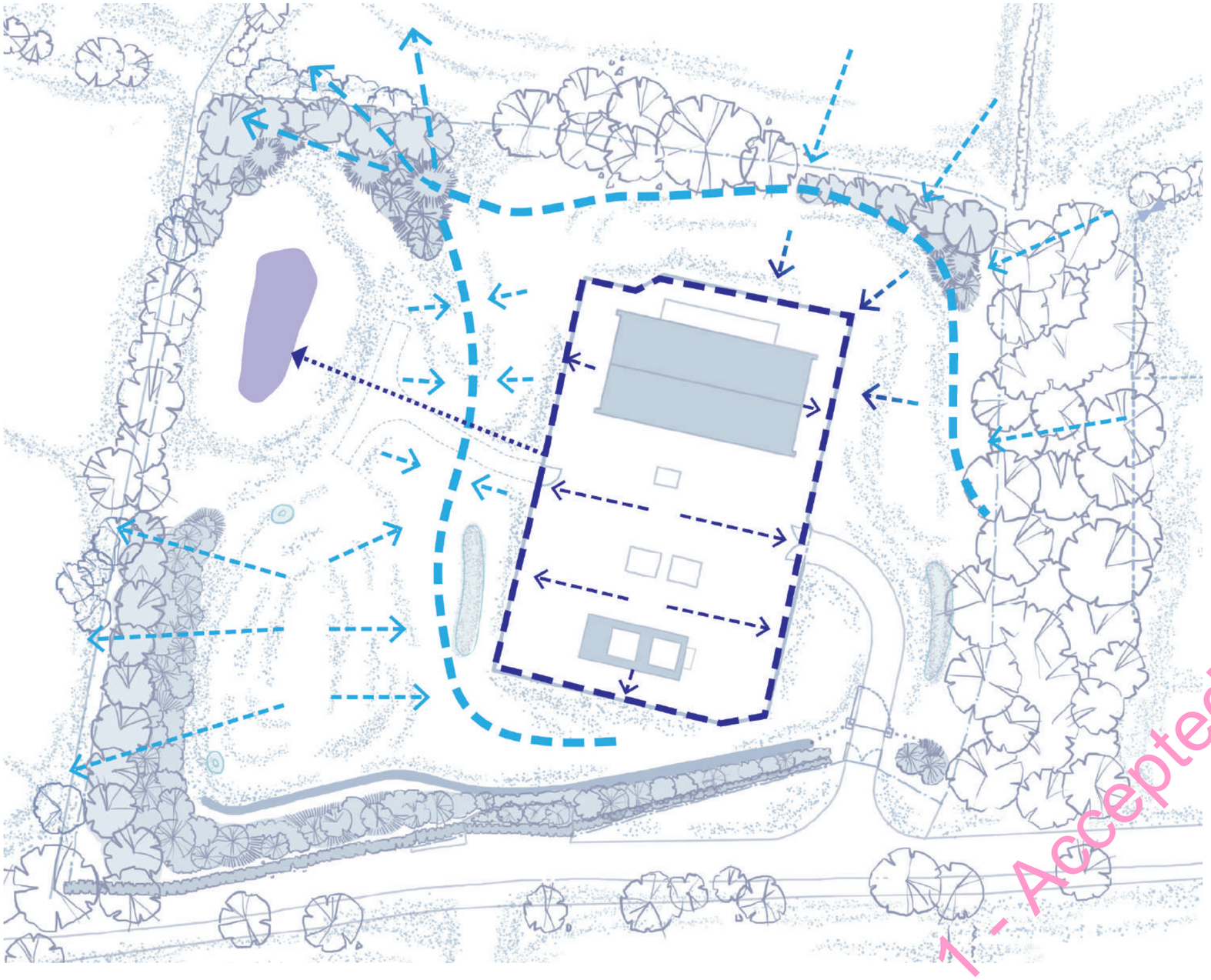


Fig.6.18_ Site and compound drainage schematic

7.0 Sustainability

Summary of how environmental, social and economic considerations have influenced the design proposals.

Overview

7.1.1 Overview

HS2's ambition is to build the most sustainable high speed railway of its kind in the world. The HS2 sustainability policy identifies five themes reflecting the economic, environmental and social aspects of sustainability.

These are:

- Spreading the benefits: Economic growth and community regeneration
- Opportunities for all: Skills, employment and education
- Safe at heart: Health, safety and well-being
- Respecting our surroundings: Environmental protection and management
- Standing the test of time: Design that is future proof

7.1.2 Sustainability commitments

The Main Works Civil Contract (MWCC) has made sustainability related commitments as a part of their Undertakings and Assurances and meeting HS2 Technical Standards. These commitments include:

- The Infrastructure works will be designed and constructed to meet an aspirational rating of 'Excellent' under BREEAM Infrastructure (Pilot) scheme.
- Develop a carbon management strategy with a carbon reduction target of 50%. The sustainability criteria are applied to all stages of the project, through design, construction and operation.

7.1.3 BREEAM assessment

The HS2 Phase One development is being assessed against the BREEAM New Construction Infrastructure (Pilot) scheme. ALIGN JV is required by HS2 to ensure that all works under the MWCC C1 contract are fully compliant with the HS2 BREEAM requirements and that the C1 project aspires towards achieving a BREEAM rating of Excellent and a minimum target score of 70%.

The Chalfont St Peter Ventilation Shaft (Chalfont St Peter Vent Shaft) will be assessed as a part of the C1 assessment and its design and construction will aim to meet the target Excellent rating with a score in excess of 70%.

A BREEAM Infrastructure assessment is broken down into a Strategic Assessment and Project Detail Assessment, which includes the design/ interim stage and final/post construction stage.

A single Strategic Assessment has been undertaken by HS2 for the whole of the HS2 Phase One development. The Strategic credits awarded in this assessment total a score of 20.78%. This will be carried over to the Project Detail Assessment.

The assessment involves meeting best practice sustainability criteria (set out as a series of individual 'credits') across the following categories:

- Integrated Design
- Resilience
- Stakeholders
- Local Well-being
- Transport
- Land use and Ecology
- Landscape and Heritage
- Pollution
- Materials
- Carbon and Energy
- Waste
- Water
- Innovation

The development of this assessment is ongoing and is not required to be complete at the scheme design stage. However, where the scheme design has benefited the overall sustainability of the C1 section of HS2, some of these are referred to in the following sub-sections.

7.1.4 Resilience

A Climate Change Adaptation & Resilience report has been prepared identifying measures to mitigate and adapt for potential climate impacts.

All vent shafts structures are designed with consideration for the 1 in 1,000 year storm event; and all drainage in vent shaft compounds is sized for 1 in 1,000 year storm event. The 1 in 1,000 design of the shaft is sufficient to avoid flooding and has more critical flows than the 1 in 100 + 60% climate change scenario for both the vent shaft structures and the shaft compounds. The building on Chalfont St Peter is generally not designed to be occupied or heated and therefore, heating and cooling systems for human occupation are not subject to climate change impacts. However, some mechanical and electrical systems within the buildings will require mechanical heating.

Sustainable drainage systems (SuDS) will be provided where possible with allowance for climate change, in accordance with current best practice planning guidance.

The surface water drainage system will collect runoff from the head house buildings, the compound, the cut face of the earthworks, and part of the access road. The compound is impermeable except for the filter drain and the gravel strip between the filter drain and the fence. The surface water drainage flows will be discharged to an attenuation basin in the south west corner of the site, approx. 45m from the edge of the basement building with the only viable option being to discharge to groundwater via boreholes within the attenuation basin.

The choice of planting species and procurement of planting stock will take into consideration climate change resilience; this is guided by HS2 Technical Standard HS2-HS2-SU-STD-000-000003 (Climate Change Adaptation and Resilience)

The Chalfont St. Peter Shaft includes the external concrete Diaphragm walls (D-walls), capping beams, concrete internal liner, the base slab, the primary and secondary linings of the intervention adits, including a crossing adit and a connection adit. All materials specified for the shaft are highly durable and robust, maximising the design life of the asset.

7.1.5 Stakeholder

There has been extensive stakeholder consultation and engagement, which has influenced the design of the structure and landscape. The design has been shared with the Local Authorities, statutory consultees, key environmental groups, businesses and the local community. Three public engagement events have been held through 2018 and 2019 where the designs were exhibited, and feedback received. This has influenced the construction methodology and has resulted in new haul roads to divert heavy vehicles traffic from the local roads; and installation of barriers to protect the local neighbourhood of unwanted noise. In addition to the above, regular engagement with the community throughout the construction programme, in accordance with the Code of Construction Practice, will be undertaken.

7.1.6 Land Use and ecology

A biodiversity action plan (BAP) will be produced for the CSP site and will cover construction and in-use phases of the project. Provisions will be made to protect the local habitat and species of principal importance.

Measures have been taken in the landscape design to ensure no net loss in biodiversity. These have included conserving as much of the most sensitive habitats as possible and introducing new habitats.

Areas of planting and seeding will aim to maximise biodiversity using species rich seed mixes and native species plant types. Overall, the present calculations for no net loss is showing a positive benefit which will be carried forward into the technical design stage. Areas around the Chalfont St Peter and other shaft sites will include the creation of wildflower and invertebrate-rich calcareous grassland, and 'wood pasture' type habitats, the latter created through tree and scrub planting (with natural colonisation supplementing planting). These habitats are now rare and threatened both locally and across England. The habitat creation will contribute substantially to local nature conservation objectives.

Please refer to chapter 6 for more information on landscape and ecology.

7.1.7 Landscape and heritage

The landscape design will be fully integrated and maximises the biodiversity potential of new areas of landscape planning and habitat creation.

Extensive stakeholder engagement has helped to understand what is important to the local community. The landscape section of this Design and

Access Statement includes full details of the proposed landscape design and the restoration proposals 1MC05-ALJ-TP-REP-CS02_CL04-000031 sets out the proposed species mix and management regime associated with this.

The Chalfont St Peter shaft site is located in rural area with a broad pattern of landscape and settlement which was primarily laid out during the medieval and early medieval periods. Approximately 230m north of the shaft site is the Ashwell's Farmhouse grouping containing Ashwell's Farm, Ashwell's Barn and a number of former farm buildings converted to domestic use. Ashwell Farm is a Grade II listed building with post-medieval origins, probably dating to early 17th century. A heritage specialist will be integrated into the project team to provide support with preservation and mitigation measures with respect to the heritage assets. The specialist will also undertake monitoring and reporting of the mitigation works during the construction process.

7.1.8 Pollution

Air quality mitigation measures for construction and operation will be identified and implemented.

All non-road mobile machinery engines will be required to comply with current versions of EU Directive Staged Emission Standards (97/68/EC).

A plan to minimise watercourse pollution will be developed for the construction of the Chalfont St Peter shaft and will include the reusing water on site.

The Chalfont St Peter Vent Shaft will aim for the operational noise and vibration to be less than the significant observed adverse effect level (SOAEL) through the use of best practicable means (BPM).

The temporary lighting on the Chalfont St Peter Vent Shaft will make sure that it will be directed onto the site, away from the sky, dwellings and areas containing wildlife.

7.1.9 Materials

A life cycle assessment has been undertaken to determine the impacts of the project over the course of its lifetime, from cradle to grave. Opportunities have been identified through the design process to use materials with lower embedded carbon. Materials that have significant carbon emissions will be specified with Environmental Product Declarations (EPDs).

A Sustainable Procurement Plan has been prepared to make sure all major materials including for the temporary works will be responsibly sourced. Discussions have taken place with suppliers to make sure both EPDs and BES 6001 certification can be provided.

The volume of concrete required for the construction of CSP has been reduced where possible through design optimisation. The specification for most concrete components will include a proportion of ground-granulated blast-furnace slag (GGBS), to achieve high levels of durability and strength. GGBS is obtained by quenching molten iron slag from a blast furnace in water or steam, to produce a granular product that is then dried and ground into a fine powder. As a by-product of the steel manufacturing process, the use of GGBS in concrete provides environmental benefits.

Zinc uses the least amount of ores out of all non-ferrous metal cladding, approximately 1/4 that of aluminium and 1/2 that of copper and steel. Additionally, zinc requires low levels of maintenance during its life cycle and is a self finish material that ages with beauty, avoiding the requirement for continuous redecoration.

Please refer to section 5.5.6 for more information on materials.

7.1.10 Carbon and energy

The carbon impact of the Chalfont St Peter Vent Shaft has been calculated over its expected lifetime. Opportunities have been identified to reduce the carbon by 32% from the baseline carbon footprint. Key reductions in carbon are attributed to the reduction in materials including concrete and steel based on design optimisation.

7.1.11 Waste

The project will aim to divert up to 95% (tonnage) of construction waste from landfill. All excavated materials generated on site will be reused on the scheme.

7.1.12 Water

Measures to reduce water consumption are being considered such as the use of water efficient fittings in all compounds and collecting surface water run off for reuse for dust suppression and wheel washing. The construction method of the shaft Diaphragm walls (D-walls) negates requirement for dewatering during the construction process will result in a substantial reduction in water abstraction compared with other processes.

HS2 Sustainabilty Goals

Spreading the benefits

Economic growth and community regeneration

Being a catalyst for regeneration and economic growth across the UK, maximising the benefits to communities and individuals and minimising the negative impacts

Opportunities for all

Skills, employment and education

Providing rewarding jobs and careers that are open to all in society, setting new standards for equality, diversity and inclusion and providing a legacy of skills, learning, expertise and experience

Safe at heart

Health, safety and well-being

Creating a world-class 'safe at heart' culture where no one gets hurt, and which prioritises the health and well-being of those who build, operate, use and host HS2 services and infrastructure

Respecting our surroundings

Environmental protection and management

Being a catalyst for breaking new ground wherever possible on environmental standards including resource use, waste, carbon minimisation, the protection of the natural and historic environment and safeguarding communities.

Standing the test of time

Design that is future-proof

Designing a network that is resilient to climate change, adaptable to future trends and demands, and built around the needs of the people who will use it.

Fig.7.1_ HS2 sustainability goals

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8.0
Engagement

Summary of the various methods and results of engagement with local authorities, stakeholders, the local community and the HS2 Independent Design Panel undertaken to date.

Engagement Process

8.1

8.1.1 Overview

ALIGN JV has undertaken extensive engagement with the Chilterns AONB Review Group and HS2 Independent Design Panel. Design proposals have also been shared with Buckinghamshire Council (formally Chiltern District and Buckinghamshire County Council), statutory consultees, environmental groups and local communities through public engagement events. Engagement with these parties has informed the design proposals subject to these Schedule 17 requests.

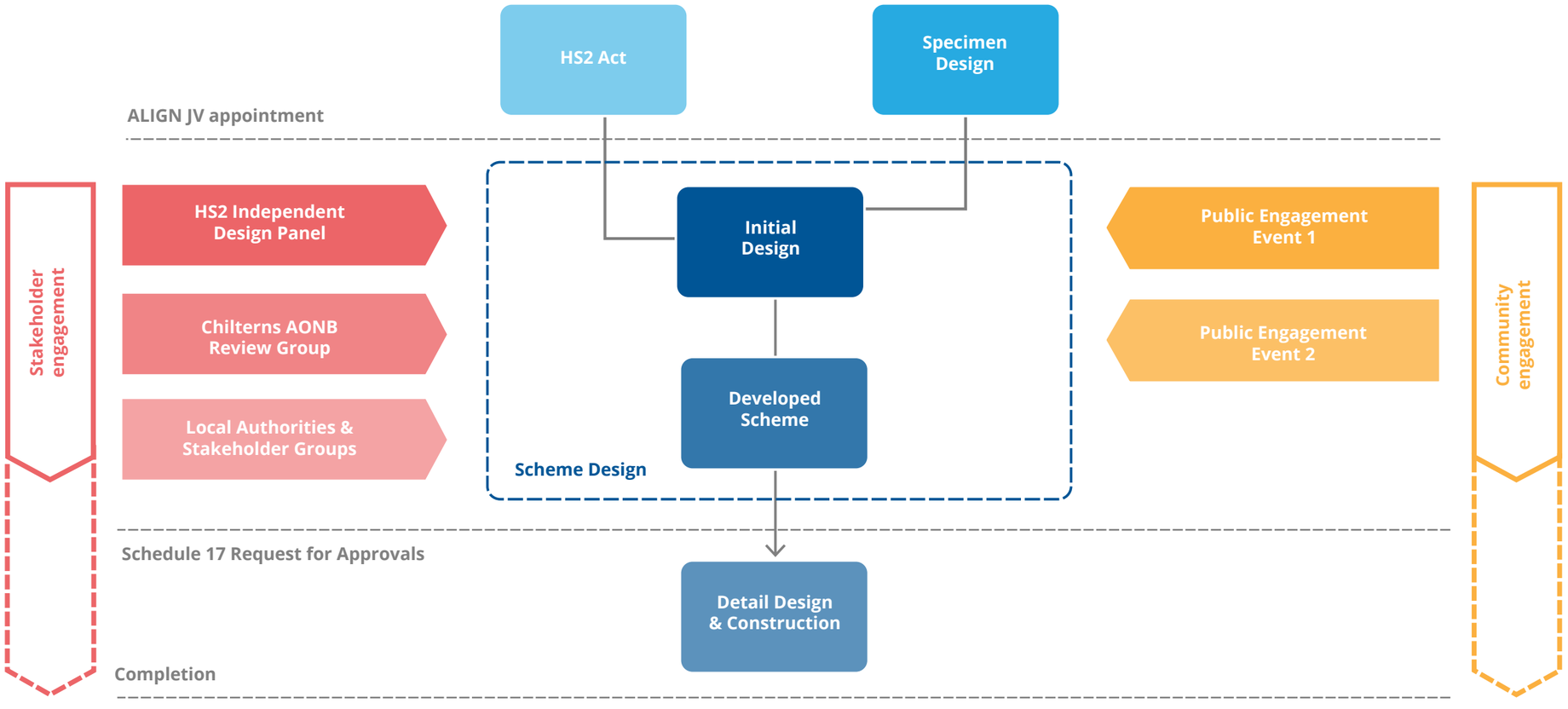


Fig.8.1_ Diagram - Engagement process

Stakeholder and Public Engagement

8.2

8.2.1 Stakeholder engagement overview

ALIGN JV has worked closely with key stakeholders to seek views and ideas to help develop the design of the Chalfont St Peter Vent Shaft and associated landscaping. The key stakeholders engaged during the design process to include:

- Chilterns AONB Review Group
- Local Authorities including Chiltern District Council and Buckinghamshire County Council (now amalgamated in to Buckinghamshire Council)
- Local communities
- Natural England and the Environment Agency
- HS2 Independent Design Panel

For further information on stakeholder engagement please refer to the Written Statement (1MC05-ALJ-TP-REP-CS02_CL04-000029) and the HS2 Independent Design Panel Report submitted as an appendix to this Design and Access Statement (refer to chapter 10).

8.2.2 Public engagement overview

Seeking public views and ideas for Key Design Elements is a crucial part of the design development process. In accordance with the strategy utilised for the Colne Valley Viaduct, ALIGN JV ran two rounds of public events – an Initial design and a 'You said, we did' event. This approach allows stakeholders to view early design proposals, provide comments and then see how we have responded to the comments we received.

Feedback from the Initial design event in October 2019 was gathered from freepost questionnaires, email, and an online survey. Respondents were also given the option to submit comments by phone to HS2 Enquiries. Respondents were asked to complete a questionnaire covering four topics and were asked to rank our objectives in order of priority and provide additional comments.

In July 2020, ALIGN JV held the 'You said, we did' event. The feedback gathered from the first event was presented to the public along with the updated design identifying how ALIGN JV have responded to the feedback.

Public Engagement Events

8.3.1 Event 1: Initial design

In October 2019, ALIGN JV with HS2 Ltd invited over 3,000 local residents and businesses to a public event held at Chalfont St Peter Parish Church Hall. Nearly 100 residents attended the event at which ALIGN JV presented the initial design proposals. At the events the public were presented with 14 exhibition panels describing the following themes;

- Existing context
- Landscape design
- Ecology of site
- Design proposal
- Building principles and materials
- Construction site layout and processes
- Views from chesham lane and public footpath

Residents were provided with leaflets summarising the initial design proposals together with a questionnaire asking them to provide feedback on four design and construction topics. They were asked to rank a series of design objectives, by rating them from 1 (high) to 6 (low), in order of priority and provide additional comments. Exhibition materials and the questionnaire were made available online.

The top-ranking objective in each category is shown below along with some of the comments received:

Ecology

- You Said: Protect existing wildlife species on the site during construction
- "There are newts, badgers and snakes on the site. How are you going to protect them during construction?"
- "Will wildlife return after construction?"

Landscape

- You Said: Replace lost trees and hedgerows which must be removed during construction
- "Keep the area wild/natural."
- "We want the AONB to remain."

Headhouse design

- You Said: Design structures that can be concealed or blend into the landscape
- "Please do your best to hide it."
- "The building looks unobtrusive."

Construction

- You Said: Return the construction site to how it was before construction started
- "Turn lights off when not needed, and please limit the vehicle noise. Lorry reversing noises are annoying and can be heard from a long distance away... please try to reduce!"
- "Please dont run HGVs on the streets of our village and past our school. We already have to put up with dangerous amounts of construction and vehicles which are not suitable for the narrow lanes and roads."

In addition to the feedback received through these formal channels, ALIGN JV had many conversations at the event and through other engagement meetings with community groups and stakeholders. While this is not classed formally as feedback to be analysed, the discussions were very useful in understanding what the concerns and local priorities were for residents.

The list below summarises some of the main topics of conversation during the engagement period:

- HGV movements and management of lorry numbers including questions about the proposal to build an access road linking the A413 Amersham Road directly to the site (bypassing village roads)
- Questions about the long-term plans for the site and access road once the vent shaft is completed eg. "Will the access road be turned into a cut through for traffic to Chesham Road?" and "What is to stop the council using the land around the site to build houses on?"
- Concerns regarding traffic management and the impact on local travel times, particularly on the A413 in peak times
- Questions about existing environmental mitigation site to the north of the compound – suggested improvements and questions about future plans for this and the whole site
- Concerns from residents of Valentine Way and The Brow regarding noise and light pollution from the site – particularly lights from security lighting and vehicle reversing alarms

Fig.8.2_ Selected engagement panels - Initial design event

Headhouse Design Views
Chalfont St Peter Ventilation Shaft

ALIGN Working on behalf of HS2

Public Footpath View

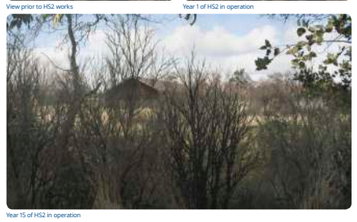
This view is from the footpath to the south of the site.

Year 1 of HS2 in operation - The proposed headhouse is clearly visible through breaks in the vegetation that bound the footpath.

Year 15 of HS2 in operation - The scrub planting in the foreground will have grown to provide filtered views through to the headhouse compound.

View prior to HS2 works

Year 1 of HS2 in operation



Year 15 of HS2 in operation

View from Chesham Lane looking West

This view looks west from Chesham Lane close to the proposed permanent access road entrance.

Year 1 of HS2 in operation - The headhouse is visible beyond the agricultural style gate and fence in the foreground.

Year 15 of HS2 in operation - The new hedge planting and scrub planting will be established enough to provide more visual screening of the headhouse building and integrate it with the surrounding landscape.

View prior to HS2 works

Year 1 of HS2 in operation

Year 15 of HS2 in operation

Have your say on the headhouse and vent shaft design

Design Development
Chalfont St Peter Ventilation Shaft

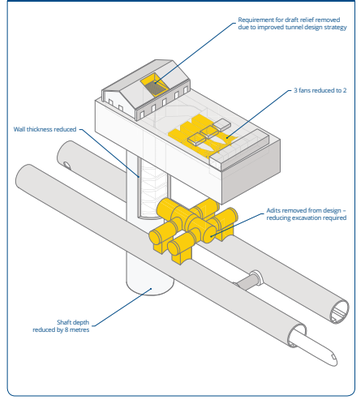
ALIGN Working on behalf of HS2

Developing the HS2 specification

In agreement with HS2, we have:

- Reduced the height of the headhouse by approximately two metres by locating equipment into a basement
- Substantially reduced the length and width of the building
- Reduced the size of the operational compound
- Reduced the diameter of the vent shaft from circa 30 metres to 17 metres, reducing the number of lorries required for earthworks significantly
- Relocated the access road away from local properties
- Moved the shaft further away from Chesham Lane to improve screening
- Reduced the number of fans required and removed the need for release of air ahead of the passage of each train.

Changes to headhouse and vent shaft design



Reducing the operational size of the compound

Size of the compound in the Hybrid Bill

This is our proposal

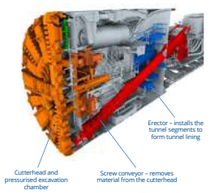
The Tunnel Boring Machine

ALIGN Working on behalf of HS2

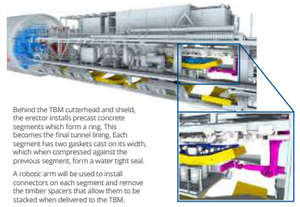
The Tunnel Boring Machines (TBMs) designed to bore the Chiltern tunnels have been specifically chosen and designed to protect the local ground water and chalk aquifers. They will do this by maintaining precise pressures and densities at the cutting face, preventing slurry loss into the chalk. A paste is created at the front by mixing excavated chalk with chalk slurry.

By maintaining the pressure, the TBMs can reduce ground water entering the excavation chamber during tunnel construction. In addition, our machines allow for a slurry treatment plant to be used manage the spoil management at the South Portal.

Inside the TBM shield and Cutterhead



Segment Assembly



Behind the TBM cutterhead and shield, the erector installs precast concrete segments which form a ring. This becomes the final tunnel lining. Each segment has two gaskets cast on its width, which when compressed against the previous segment, form a water tight seal.

A robotic arm will be used to install connectors on each segment and remove the timber spacers that allow them to be stacked when delivered to the TBM.

The TBM in numbers

- Each ring is **2 metres** long x **0.4 metres** thick
- **7** segments per ring; **112,300** segments in total
- For each ring, we excavate approximately **165m³** of material, weighing roughly **320 tonnes**
- The TBM will tunnel at an average rate of **15.6 metres** every day and excavate between **30** and **60** millimetres every minute during boring
- Each TBM is **160 metres** long (approximately 1 and a half football pitches)
- Each TBM weighs **2200 tonnes** – which is over **360** African Elephants

Introduction
Chalfont St Peter Ventilation Shaft

ALIGN Working on behalf of HS2

Welcome to our information event for the Chalfont St Peter vent shaft.

Today's event is for you to ask questions about the vent shaft, construction, or design and to give us feedback to help shape our final design.

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

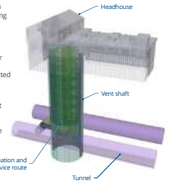
- Landscape design
- Ecology
- Design of the vent shaft and headhouse
- Construction

Your comments and feedback will be considered in the next stage of design review, which will take place over the next few months. We will keep you informed of any design changes at future events.

What is a vent shaft and headhouse?

A vent shaft, or ventilation shaft, is the vertical opening that connects the tunnels to the surface and open air. It regulates air quality and temperature in the tunnel, provides access for emergency services, and allows smoke to be extracted in the event of a fire.

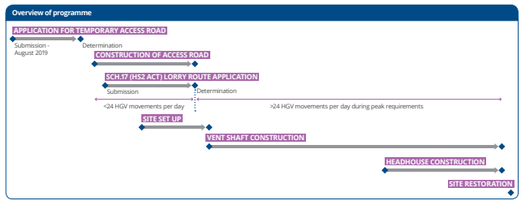
The headhouse is the building on top of the vent shaft which contains fire control systems and the ventilation systems for the railway tunnels below.



Where will the Chalfont St Peter vent shaft and headhouse be located?

The Chalfont St Peter vent shaft will be located approximately 50 metres from Chesham Lane to the south of Ashwell's Farm

Overview of programme



Construction site map
Chalfont St Peter Ventilation Shaft

ALIGN Working on behalf of HS2

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

Air Quality

We will manage dust, air pollution, odour and exhaust emissions during construction through:

- regularly inspecting and monitoring site and equipment
- cleaning (including watering) of on-site roads
- managing completed earthworks to contain dust
- regularly monitoring air quality on site

Noise

Each construction activity has the potential to have noise impacts. We are required by law to apply measures to control the effects of noise and vibration. We will be monitoring noise on site using automatic monitoring equipment. Other mitigation may include:

- tackling noise at source, reviewing the location of equipment on site
- localised screening and enclosures around noisy plant activities
- noise insulation at eligible properties, subject to assessment

Traffic Management

We will manage the logistic routes and site traffic carefully during construction:

- ensuring compliance with vehicle safety standards
- providing enhanced training for drivers
- scheduling site deliveries to avoid congestion
- tracking spoil removal trucks using GPS to ensure correct routes are used
- installing clear signs at site approaches and exits

Indicative plan for construction site

Have your say on construction impacts

Objectives for feedback
Chalfont St Peter Ventilation Shaft

ALIGN Working on behalf of HS2

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 design

- Reflect the rural character of the site and its surrounding landscape
- Find ways of reusing soil and materials excavated from the vent shaft in the new landscape
- 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, footpaths, Chesham Lane)
- Consider the long-term management of site and appearance of the landscape

Ecology

- Keep as many existing trees and hedgerows as possible
- Restore the area using planting or seeding 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
- Create ponds to encourage new aquatic species to colonise the area
- Protect existing wildlife species on the site during construction

Design of the vent shaft and headhouse

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

Construction

- Reduce noise and vibration on construction site
- Let people know when noisy works are occurring and keep residents regularly updated with progress
- Return the construction site to how was before construction started
- Minimise any visible impact of construction
- Reduce movement of earth and dirt by road
- Minimise construction footprint, and reduce noise and air pollution across construction sites

Fig.8.3_ Selected engagement panels - Initial design event

Public Engagement Events

8.3.2 Event 2: You said, we did

In accordance with the established engagement strategy, in July 2020 ALIGN JV held the 'You said, we did' exhibition. Due to restrictions caused by COVID-19, ALIGN JV were unable to hold a face-to-face event. However, over 3,000 local residents were invited to visit the online virtual exhibition at which they were presented with the feedback received from the public and updated designs. The exhibition hosted 12 panels describing the following themes:

- Landscape and ecological design
- Site compound
- Building principles
- Design proposal
- Building appearance
- Materials
- Visualisation from chesham lane and public footpath
- The construction site
- Traffic management

The exhibition was hosted on the HS2 in Bucks and Oxfordshire Commonplace website and was live for one month. It was accessed by over 290 unique users in that time. PDF copies of the panels were also made available. Some of the 'You said, we did' statements relating to the design of the Chalfont St Peter Vent Shaft were as follows:

You said...

- Replace lost trees and hedgerows which must be removed during construction

We did...

- Retain mature trees and habitat within field boundaries
- Preserve the character of the AONB
- Conceal structures where possible

You said...

- Protect existing wildlife species on the site during construction

We did...

- Incorporate habitat features – hibernacula, basking banks, bat & bird boxes

You said...

- Design structures that can be concealed or blended into the landscape

We did...

- Move the building as far away from the road as possible
- Arrange the buildings around an agricultural style courtyard
- Design the building to have a simple contemporary barn aesthetic
- Choose a simple robust palette of materials that will age naturally

You said...

- Please don't run HGVs on the streets of our village & Keep lorries from queuing inour villages

We did...

- Built a temporary access road for Heavy Goods Vehicles (HGVs)
- Created a lorry holding area on the A413 near Gerrards Cross

You said...

- Return the site to how it was before construction started

We did...

- Designed the compound to fit within the existing landscape
- Retained excavated soil on site to re-use in landscaping
- Preserved Public Rights of Way

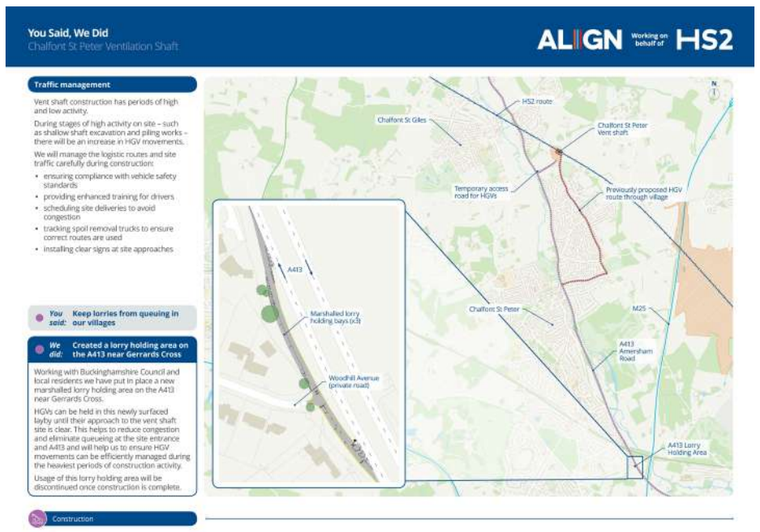
You said...

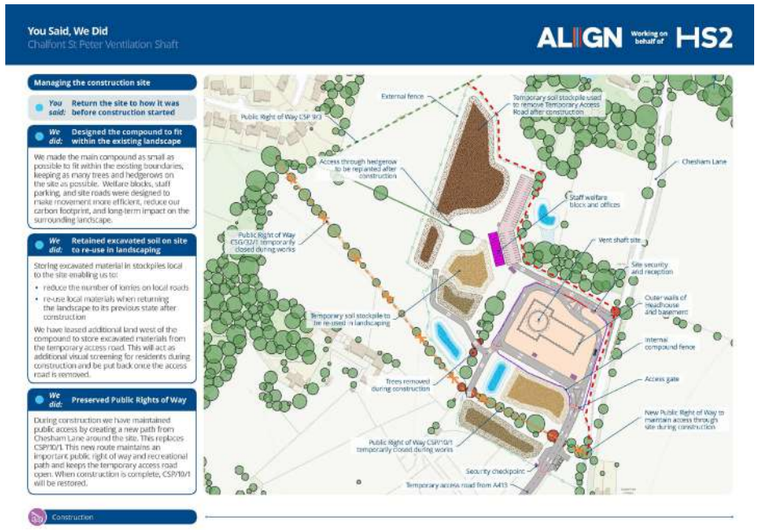
- Reduce noise and vibration during construction

We did...

- Implement noise and air quality monitoring on site
- Commit to letting residents know about noisy works in advance
- Implement mitigation measures during construction

Fig.8.4_ Selected engagement panels - 'You said, we did' event





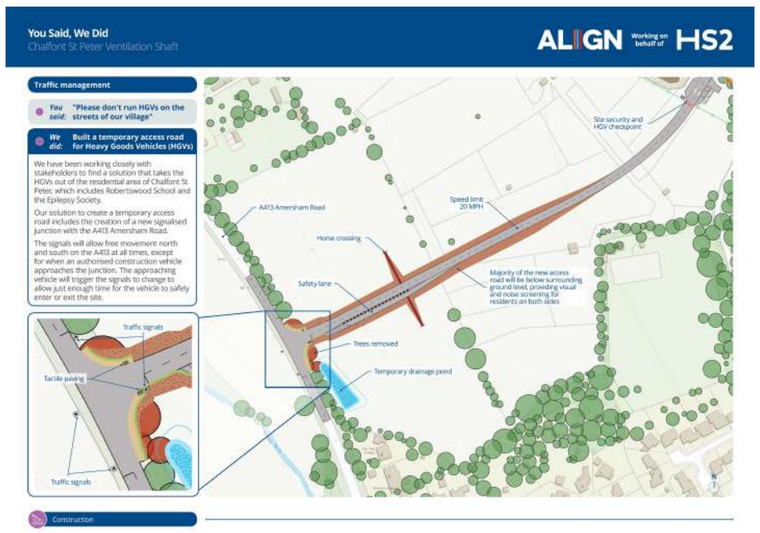


Fig.8.5_ Selected engagement panels - 'You said, we did' event

9.0
Summary

Summary of the Chalfont St Peter Vent Shaft and landscape design proposals alongside the feedback from the HS2 Independent Design Panel.

Overview

9.1.1 Summary

Chalfont St Peter (CSP) Ventilation Shaft has been sensitively designed to complement the rural character of the Chilterns. The form and materiality of the buildings are a modern interpretation of the local agricultural and industrial vernacular. The single-story buildings are wrapped in simple grey zinc standing-seam cladding with steel door and vent openings distinguished by a dark brown / grey colour. The pre-weathered grey zinc roof will age naturally over time, providing the buildings with a sense of permanence and high levels of robustness.

The position and orientation of the headhouse buildings have been carefully located within the site to conceal them within the landscape and form a courtyard similar to local farmyard arrangements. Mature trees along the existing boundary are being retained as far as possible to help screen the site from neighbouring properties. Glimpsed views through vegetation along the public right of way provide views of the headhouse buildings sitting within their surrounding landscape setting.

The landscape and ecological design will increase biodiversity value within the site and create a setting for the headhouse which positively reflects the character and qualities of the landscape on the edge of the AONB. The proposals establish a mosaic of habitat types including species rich grassland; new tree and scrub margins; and ephemeral waterbodies. In addition, bird boxes, reptile basking banks, a grass snake laying heap and a hibernaculum will be provided. Most of the existing mature trees and hedgerows will be retained around the site boundary to provide screening and maintain established habitat corridors. Some of the excavated material from the vent shaft will be reused to create subtle changes in topography and avoid off-site export and extra vehicle movements on local roads

Below ground level, a 60 metre ventilation shaft will reach down to the twin tunnels below, with fans and other equipment designed to regulate air quality and temperature in the tunnels, remove smoke in the event of a fire and provide access for the emergency services.

The proposed design for CSP Ventilation Shaft achieves the briefing criteria set out in Section 3 of this DAS; including the HS2 core design principles and goals, a host of demanding technical and operational requirements, the environmental requirements, and the extensive commitments set out in the HS2 Act.

9.1.2 Conclusion

The challenging requirements of the brief have been balanced with the aspirations of stakeholders, the Local Planning Authority (LPA) and the local community. The proposed design is the result of extensive engagement with the Chilterns AONB Review Group, the HS2 Independent Design Panel (HS2 IDP), Buckinghamshire Council, statutory consultees, environmental groups and local communities. The recommendations and feedback provided during this engagement process have been key to informing the design now presented for approvals.

The proposed CSP Ventilation Shaft design, in a form ready for Schedule 17 submission, was presented to the HS2 IDP on 23 June 2020 and their subsequent report is included in Appendix 10.1.

The HS2 IDP report states that the architecture of the headhouses promise to deliver buildings of a high design quality, succeeding in creating a group of recessive structures that work together. It states that the landscape design has been developed with thoroughness and has the potential to make a positive contribution to the area. The report goes further to state that proposals for habitat creation are of a high quality and convincing detail. It notes that the design meets the aspirations of the HS2 Design Vision, outlined in Section 3.1 of this DAS. The HS2 IDP report also recommends that the design quality presented at Schedule 17 stage is maintained through detailed design and construction. ALIGN JV will continue this approach during detail design and construction of the headhouse buildings and landscape design.

The landscape approach presented in Section 6 of this DAS has been carried through in the Indicative Mitigation Details (1MC05-ALJ-TP-CRO-CS02_CL04-000026) (IMD) and, for land within the headhouse site boundary, in the Restoration Proposals (1MC05-ALJ-TP-REP-CS02_CL04-000031). The views of the Local Planning Authority and other stakeholders on these will be carefully considered.

ALIGN JV wishes to thank all stakeholders, the LPA, the HS2 IDP and the community, for their views, ideas and feedback, and look forward to continuing to work closely with them on the future stages of the project.

9.1

Fig.9.1_ Visualisation - Aerial view looking north north west (Year 15)

Fig.9.2_ Visualisation - PRoW to west of site looking east (Year 1)

Fig.9.3_ Visualisation - Chesham Lane looking west (Year 1)

Fig.9.4_ Key plan

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Fig.9.6_ Visualisation - Chesham Lane looking west (Year 15)

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Appendices

HS2 Independant Design Panel Report

HS2 INDEPENDENT DESIGN PANEL

REPORT

HS2 Design Panel Meeting to discuss the Schedule 17 stage designs for Chalfont St Peter Headhouse

10.00 – 13.00 Tuesday 23 June 2020
Via Microsoft Teams

HS2 Independent Design Panel

Sadie Morgan (chair)	Chair of the HS2 Independent Design Panel
Tony Burton	Vice chair of the HS2 Independent Design Panel
Kathryn Moore	HS2 Independent Design Panel
Martin Stockley	HS2 Independent Design Panel

Attendees

Mark Clapp	Senior Project Manager Area Central, HS2 Ltd
James Dearing	Design Manager, HS2 Ltd
Kevin Roberts	Lead Senior Project Engineer, HS2 Ltd
Chris Patience	Architect, ALIGN JV
Diane Metcalfe	Architect, ALIGN JV
Simon Railton	Landscape Architect, ALIGN JV
Leigh Crowhurst	Landscape Architect, ALIGN JV
John Woodhouse	Town Planning and Consents, ALIGN JV
Peter Higginbottom	Town Planning, ALIGN JV
Alan Price	Design Director, ALIGN JV
Ian Thomas	Project Manager, ALIGN JV
Matt Hobbs	Ecologist, ALIGN JV
Saeed Mahmood	Buckinghamshire Council
Richard Hannay	Buckinghamshire Council
Deborah Denner	Frame Projects
Tom Bolton	Frame Projects

Apologies / copied to

Kay Hughes	Design Director, HS2 Ltd
David McCann	Senior Project Manager, HS2 Ltd
Steve Austin	Town Planning Manager, HS2 Ltd
Ben Northover	Architect, ALIGN JV
Bernadette Hurd	Head of Benefits, HS2 Ltd
Christoph Brintrup	Head of Landscape, HS2 Ltd

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Delivered by Frame Projects

Chelsea Evans	Apprentice Project Manager, HS2 Ltd
Clive Green	Senior Communications Manager, HS2 Ltd
Giles Thomas	Phase One Engineering Director, HS2 Ltd
Nicole Linney	PA to Design Director, HS2 Ltd
Paul Gilfedder	Head of Town Planning, HS2 Ltd
Zoe Stewart	Lead Design Manager, HS2 Ltd
Design Inbox	HS2 Ltd

Note on Design Panel process

The HS2 Independent Design Panel was established in 2015 at the request of the Department for Transport, to help ensure that, through great design, HS2 delivers real economic, social and environmental benefits for the whole country.

The HS2 Design Vision sets out nine principles grouped around three themes: People; Place; and Time. The design uses this framework to help the HS2 Ltd leadership, project teams and other partners to make the right design choices – and this also informs its advice on designs that are to be submitted under Schedule 17 of the High Speed Rail (London – West Midlands) Act 2017.

The panel plays an advisory role, providing impartial and objective advice, to support the design process. At a pre-application stage it is for HS2 Ltd to decide what weight to place on the panel's comments balanced with other considerations. Once a Schedule 17 application is submitted, the panel's advice may inform the local planning authority's decision making process.

Further details of panel membership and process are available at:
https://www.gov.uk/government/publications/hs2-design-panel

The HS2 Design Vision is available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/607020/HS2_Design_Vision_Booklet.pdf

The HS2 Independent Design Panel comments below follow on from two pre-application reviews of the Chalfont St. Peter Headhouse.

Timing of Schedule 17 meeting

This meeting took place in advance of a Schedule 17 submission for the Chalfont St. Peter Headhouse - which will be submitted around August 2020. The application will also include supporting information regarding the site restoration proposals, including full details of soft landscaping measures. 'Site restoration' and 'bringing into use' requests will also be submitted to the local planning authority, at a later stage.

HS2 Ltd indicates that it is satisfied that the proposal would meet the aspirations of the HS2 Design Vision and the Sustainability Approach.

[Post meeting note: HS2 Ltd confirmed that will be no significant design changes, except some minor changes as a result of ongoing design development.]

Local planning authority views

Buckinghamshire Council

Buckinghamshire Council has held several pre-application discussions with the applicants and its general response to the proposed design is positive. It is pleased to see that recommendations from the HS2 Independent Design Panel have been addressed since the previous design panel meeting. The headhouse designs have progressed well, and the taller vents proposed do not have an adverse visual impact. The Council considers that the landscape design is not as well progressed as the headhouse architecture in some respects. Despite positive progress, the overall narrative guiding the landscape design approach should be developed further. It will be important for the Schedule 17 submission to explain how the proposals will make a contribution to ecology by delivering net biodiversity gain, and connectivity with the surrounding landform and with other sites, including the ecological mitigation planned at the Chiltern Tunnel south portal. It would like to see further progress on biodiversity enhancement and subsequent management for the site. It also seeks assurance that the minimum number of hedges and trees are removed, and that the Schedule 17 application includes landscape detailing, as well as clarity over the need for two separated drainage systems. Good progress has also been made on community engagement, but it is important that the applicant continues to involve the local community in design development, including presenting visualisations of the views to be created.

HS2 Independent Design Panel's views

Summary

The HS2 Independent Design Panel considers that the Schedule 17 stage proposals for the Chalfont St. Peter Headhouse building meet the aspirations of the HS2 Design Vision – subject to the detail of landscape design (which will be approved through a separate mechanism at a later date) and the design quality presented being maintained through detailed design and construction. The panel considers that the architecture of the headhouse structures has progressed positively, and promises to deliver buildings of a high design quality. The panel also considers that the landscape design has been developed with thoroughness, and has the potential to make a positive contribution to the area. As design development continues, it believes that further work is needed to define and describe the site as part of the surrounding landscape context, with the same level of thought that has been applied to the headhouse architecture. While the site will be seen by relatively few people, it should still be a delightful place, forming part of an extraordinary piece of infrastructure and engineering, and local people should be involved in its development. The panel believes that further landscape design development can ensure these ambitions are delivered, and that further collaboration between the design team and HS2 Ltd can address constraints imposed by the latter's requirements. Issues to address in particular are the inclusion of two separate drainage systems and the design of the compound security fencing. Further work should also be carried out to reduce the dominance of the site access. These comments are expanded below.

Headhouse architecture

The panel considers that the designs for the headhouse and vent shaft structures have developed very positively since the previous design review meeting, and that the approach now succeeds in creating a group of recessive structures that work together around a central space.

Although the brick plinth forms a small part of the visible headhouse structure, the panel suggests that a more traditional, red brickwork could be more appropriate to the Chilterns setting than the engineering brick proposed.

Landscape design approach

The panel is pleased by the work carried out to develop an ecological strategy for the site. The proposals for habitat creation are of a high quality with encouraging and convincing detail, and it encourages delivery of the strategy.

It will be important to ensure that the landscape mosaic approach includes making connections between habitats beyond the site boundary. The calcareous grassland planned at the Chiltern South Tunnel portal could provide opportunities for landscape to

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the north-west of the site, including ways to involve local people. These opportunities should be investigated further.

The panel considers that the narrative guiding the landscape design approach has developed positively, but that further work is required to ensure strong connections are made between the site and the wider Chilterns landscape. The culture and history of the setting should be expressed as clearly and confidently, to place the site in a rich and varied context.

To ensure the site contributes positively to the area, it should contribute actively wherever possible. The panel encourages the design team to develop an equivalent level of landscape design detail as already produced for the headhouse architecture, considering how the site and areas with and beyond the site boundary can contribute in areas such as water security and food provision.

The panel suggests that the tree canopy is particularly significant, especially in views of the site. Attention should be given to the way trees can contribute to views, for example using plantations of tree such as hornbeam, beach, or orchard planting.

Security fencing

The design of the compound security fencing will be important to the overall quality of the site. The panel asks that fences are drawn and specified in greater detail, addressing factors such as the spacing of stanchions, to ensure they will have the elegance to befit their setting.

The panel considers that the proposed use of three strands of barbed wire above a 2.8m mesh fence around the headhouse compound will compromise the design, giving the site a hostile, unpleasant appearance. The panel also questions the evidence supporting its effectiveness in protecting against intruders. It asks whether a material other than barbed wire can be used for the compound fence. The design team should ensure it has taken every possible step to question HS2 Ltd's requirement for barbed wire. If it must be retained, the panel suggests concealing it behind a raised fence line to reduce visual impact.

Access route

The panel considers it important that the width of the splayed entrance to the compound access road is reduced if at all possible, to avoid excessive urbanisation. While it understands that the width is required for periodic crane access to the headhouse, it suggests that a narrower permanent entrance could be designed using a material other than traditional roadway surfacing to support the weight of a crane. The panel asks that more attention is given to the landscape design of the entrance corners, and more sympathetic material options are explored.

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Hydrology

The panel considers that the inclusion of two separate drainage systems creates tension in the landscape design. Despite plans to conceal it with planting, the planned retention pond remains deep. Drainage is very important to the landscape, and the systems should be integrated if at all possible. The panel questions whether HS2 Ltd consistently requires a separate drainage for the railway, and asks the design team to soften the landform further to create place that is as sympathetic to the building as possible.

Sustainability

The panel appreciates the design team's explanation of the way the proposed designs respond to the HS2 Sustainability Approach, and considers that they will meet its requirements.

Next steps

The panel feels that the Chalfont St. Peter Headhouse building has the potential to meet the aspirations of the HS2 Design Vision at Schedule 17 stage - subject to the detail of landscape design and the design quality presented being maintained through detailed design and construction.

The panel supports the team's intention to include indicative information on the landscape as part of the Schedule 17 submission.

The landscape design will play an important role in the success of these proposals. It therefore asks that more design development is carried out in areas discussed, including the relationship with the wider landscape context, its contribution to the surrounding area and the design of drainage systems. The panel would welcome an opportunity to be involved in commenting on this at 'bringing into use' and 'site restoration' stages, once Schedule 17 decisions have been made.

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