Galley Hill Road Summary Report

KENT COUNTY COUNCIL – PROFESSIONAL SERVICES FRAMEWORK

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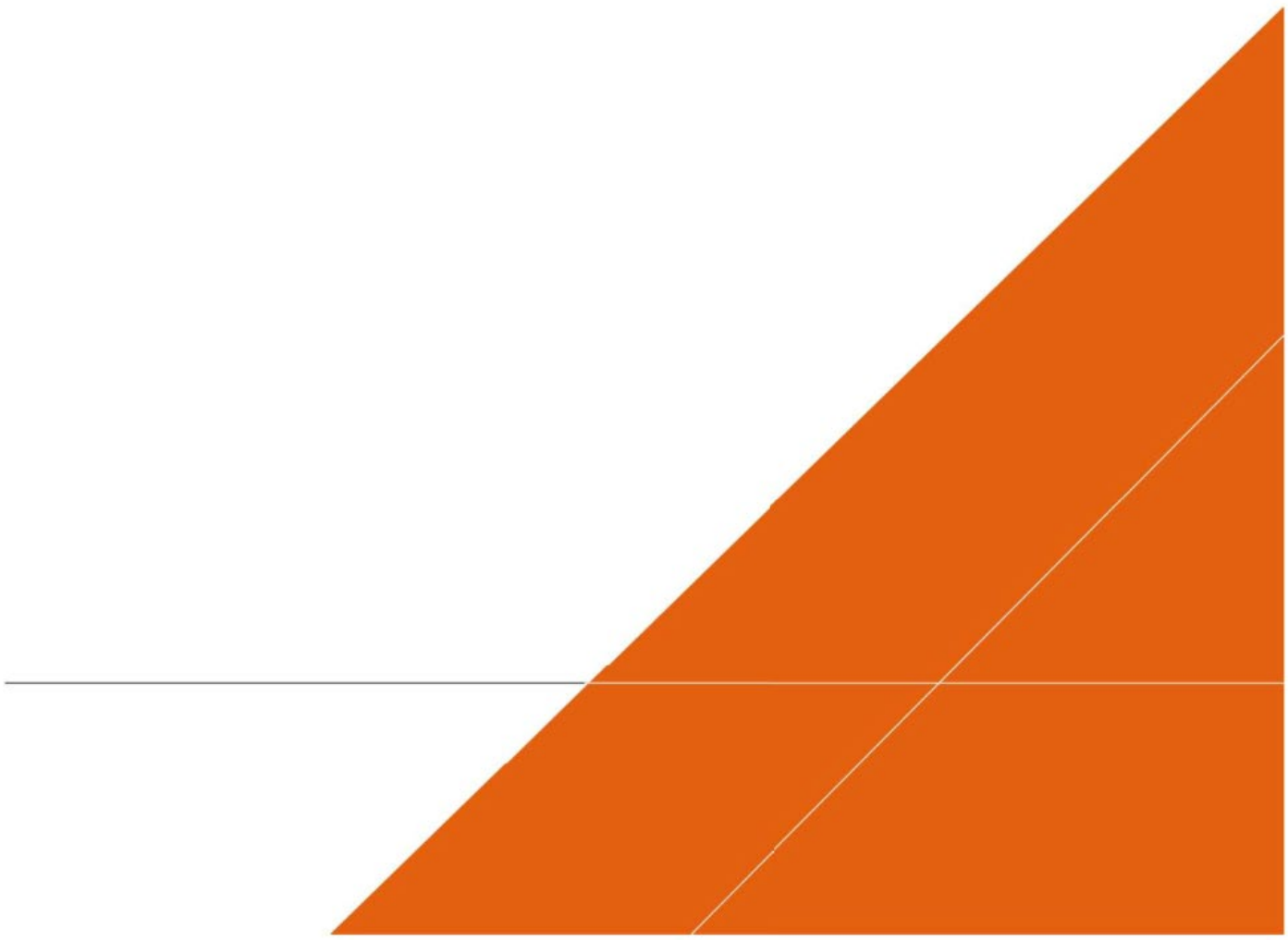

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Galley Hill Road Options Selection Report

KENT COUNTY COUNCIL – PROFESSIONAL SERVICES FRAMEWORK

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Executive Summary

Galley Hill Road in Swanscombe has been closed since April 2023 following a significant landslip affecting an elevated chalk spine approximately 20–27 m above the surrounding ground. Kent County Council (KCC) is progressing the scheme to develop a permanent engineering solution to reinstate the route, with a target reopening date of **March 2030**.

The scheme presents a complex engineering challenge driven by the interaction of:

- Variable and weakened chalk ground conditions, particularly within the failure zone
- Constrained geometry, including limited working width along the spine
- Environmental sensitivity, due to proximity to the Swanscombe Peninsula SSSI
- Restricted access and logistics, including interfaces with HS1 and surrounding land uses

Arcadis has been commissioned to undertake options selection and preliminary design. Four viable options have been developed and assessed at a conceptual level to inform selection of a preferred solution.

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1. Introduction

Galley Hill Road is a strategically important local highway in Swanscombe, Kent and has been closed since April 2023 following a significant landslip. The failure occurred along an elevated chalk spine approximately 20-27m above the surrounding ground, creating a complex engineering challenge involving unstable ground conditions, constrained geometry, and environmental sensitivities associated with the adjacent Swanscombe Peninsula SSSI. The failure is understood to be associated with variable near-surface chalk and superficial deposits, with uncertainty remaining regarding the extent of weakened material.

Key site characteristics include:

- Narrow working width along the spine
- Challenging and variable ground conditions
- Proximity to the Swanscombe Peninsula SSSI
- Restricted access, including via HS1 and local road network

The scheme involves remediation of approximately 140 m of the chalk spine, either through bridging the failure zone or excavation and reconstruction.

The site presents a highly constrained construction environment where geometry, access and ground conditions are closely interdependent. The elevated spine restricts working areas while the uncertainty in ground conditions places constraints on foundation design and temporary works. As a result, construction methodology and sequencing are expected to be critical in determining overall feasibility and programme.

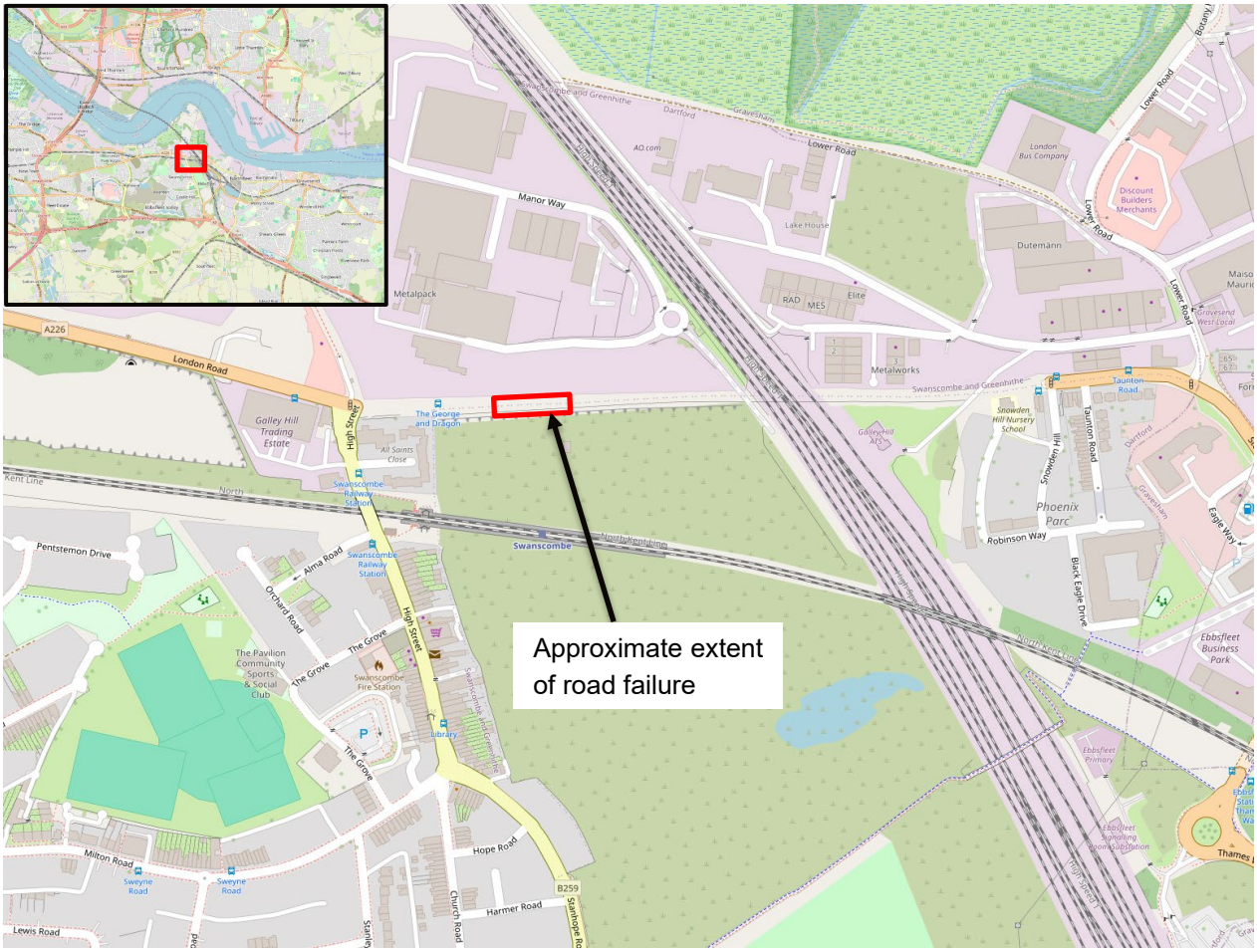


Figure 1 - Map of Site Location

2. Stakeholders

Kent County Council (KCC), as client, is the primary stakeholder and drives option selection.

Key requirements include:

- Achieving reopening by March 2030
- Minimising long-term maintenance
- Providing safe and practical inspection access
- Prioritising whole-life cost and durability

These priorities favour conventional, robust and programme-compliant solutions.

Natural England, as the statutory consultee, has a key role in protecting the Swanscombe Peninsula SSSI. Their requirements focus on:

- Protection of SSSI
- Minimisation of disturbance and footprint
- Mitigation where impacts cannot be avoided

This constrains excavation extent and may extend programme due to approvals and ecological requirements.

Additional stakeholders (HS1/Network Rail, LPA, landowners and community) introduce constraints relating to access, planning approvals, land requirements and programme risk.

At this stage, no detailed utilities strategy has been developed. Existing highway and statutory undertaker apparatus affected by the failure or proposed solutions will require confirmation at the next stage of design.

Stakeholder requirements influence both technical design and construction approach. KCC priorities favour solutions that are durable, maintainable and aligned with established practice, while environmental constraints limit the extent of intrusive works and may restrict construction footprint and methodology.

Programme risks associated with planning approvals, ecological mitigation and land acquisition are significant and may govern option viability alongside engineering considerations. As such, successful options will need to balance constructability, environmental impact and programme certainty to achieve a deliverable solution.

3. Geology and Ground Conditions

3.1.1 Geology

The site is underlain by chalk bedrock, overlain locally by superficial deposits and made ground associated with the existing road formation. The chalk spine forms an elevated landform with steep side slopes, and its engineering properties vary both laterally and with depth.

Ground investigation undertaken to date indicates that the near-surface chalk is variable and locally weakened, particularly within and adjacent to the failure zone. Zones of disturbed or destructured chalk are present, with discontinuities, fissures and voids contributing to reduced strength and stiffness. The depth and extent of these weakened zones remain uncertain due to limited investigation within the failed area.

Below this zone, more competent intact chalk is anticipated at depth, which provides a suitable formation level for structural foundations where accessible.

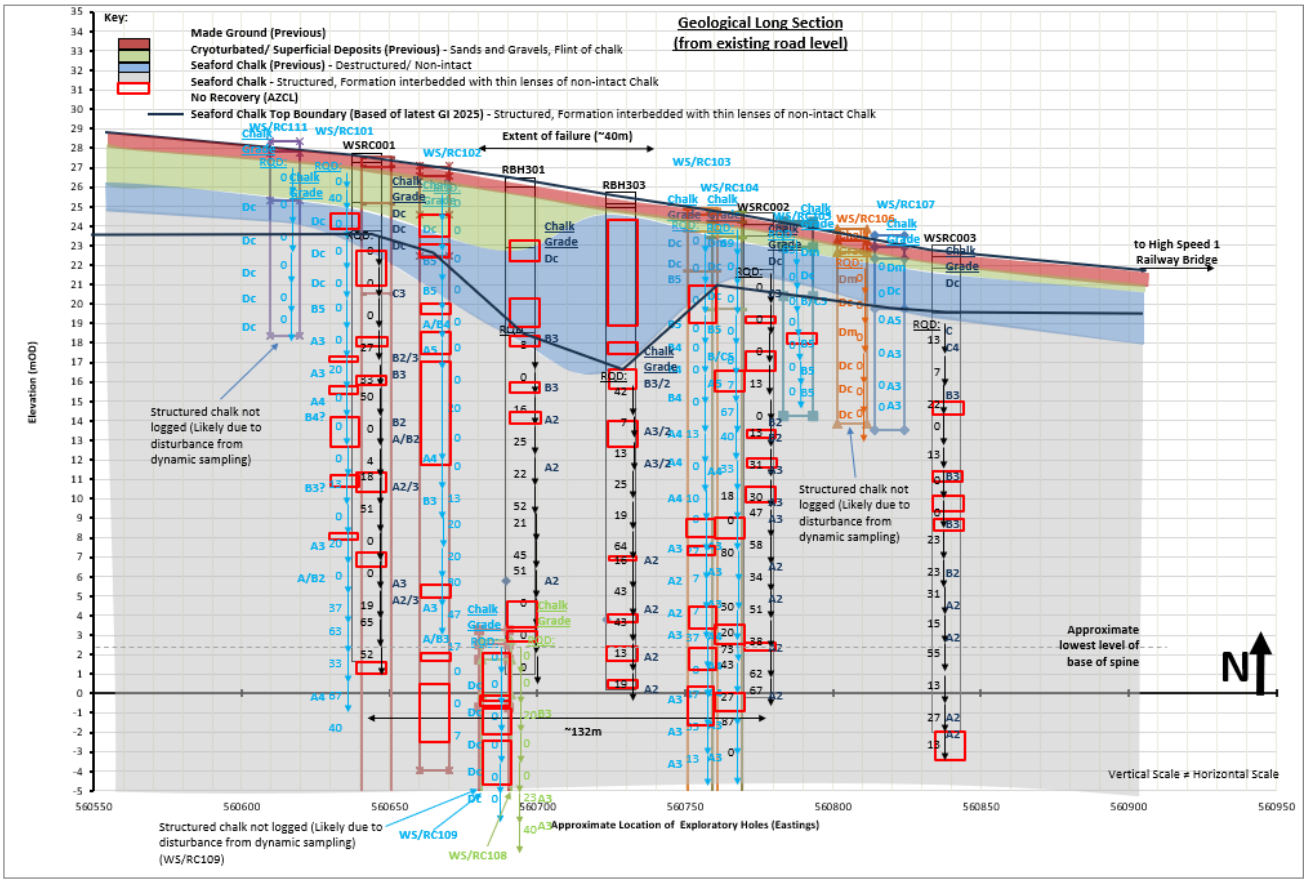


Figure 2 - Geotechnical Long Section of the Failed Zone and Surrounding Area

3.1.2 Ground Investigation Limitations and Exclusion Zones

The current ground investigation provides a developing understanding of site conditions, but some uncertainty remains. Most exploratory holes were positioned along the centreline of the spine, with limited investigation near the edges due to safety concerns. As a result, the extent of weathered or degraded chalk at the margins is uncertain. To manage this risk, a 4 m exclusion zone is proposed from the crest and edges of the spine. Similarly, ground investigation coverage is limited near the failure zone, it is proposed that a 10 m exclusion zone will be applied from the widest extent of the failure on both the eastern and western sides. and

present the proposed exclusion zones in plan and section respectively. The extents of these zones will be refined as the design progresses

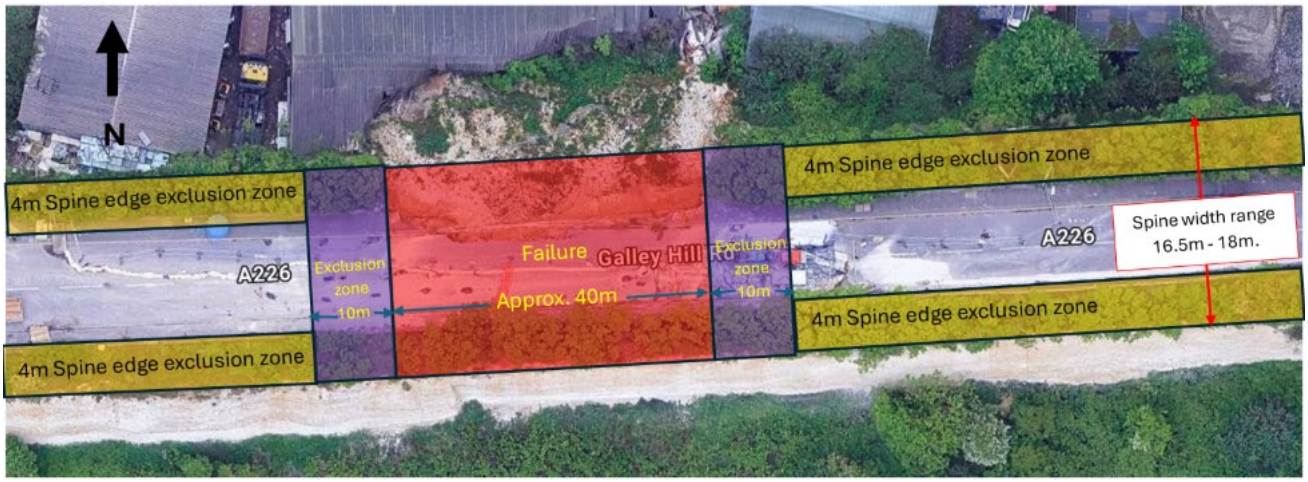


Figure 3 - Approximate Exclusion Zone Near Failure Area

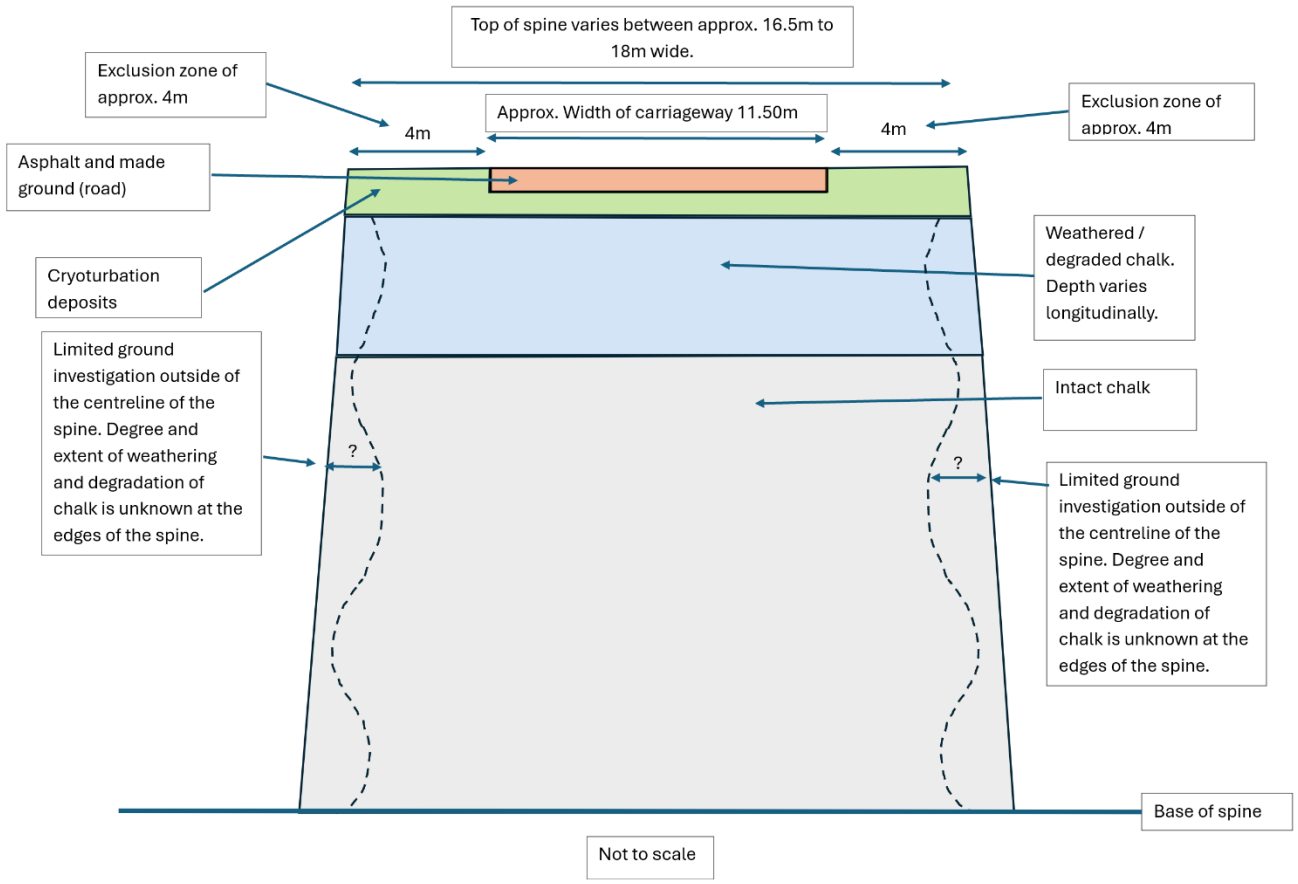


Figure 4 - Approximate Exclusion Zone Along Length of the Spine

4. Environment

The Galley Hill Road site is environmentally sensitive, with the primary constraint being the presence of the Swanscombe Peninsula Site of Special Scientific Interest (SSSI) located adjacent to and within the proposed site boundary. The southern face of the chalk spine falls within the SSSI, and any works affecting this area will require consent from Natural England under Section 28(4)(b) of the Wildlife and Countryside Act 1981.

All options are anticipated to interact with the SSSI to some extent, either through:

- Temporary access and construction activities
- Excavation and material handling operations
- Long-term asset footprint and maintenance access

Works affecting the SSSI will require agreement with Natural England, including minimisation of impacts and implementation of appropriate mitigation.

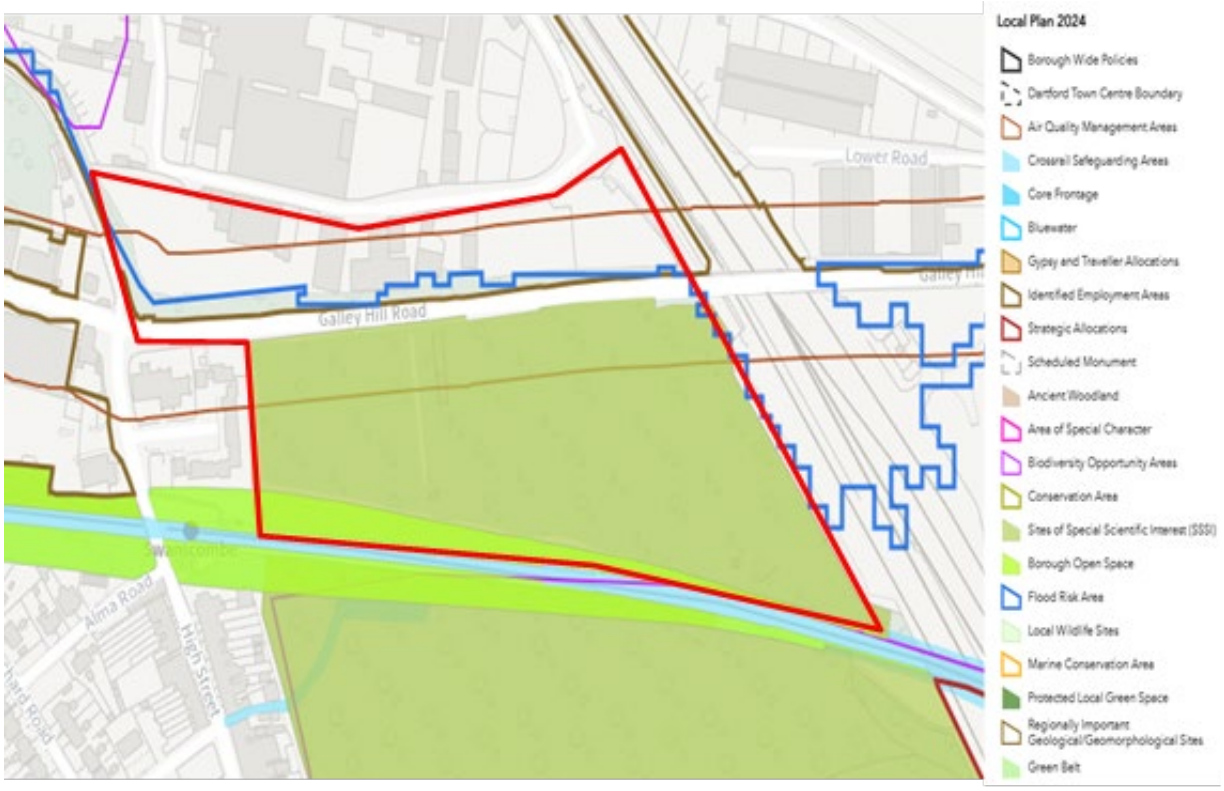


Figure 5 Site Constraints Plan (Source: Dartford Local Plan Policies Interactive Map (April 2024)

Flood Risk

Parts of the surrounding lower ground fall within mapped flood zones, which may influence the location of compounds, haul routes and crane platforms. While the spine itself is elevated, construction activities at lower levels will need to account for flood risk, including safe access, temporary works stability and programme resilience.

Unexploded Ordnance (UXO)

The potential for UXO cannot be ruled out due to the historical context of the site. This introduces a requirement for risk assessment and may necessitate intrusive surveys or supervision during groundworks, particularly for excavation-based options.

Historical Quarry Use

The site has a history of quarrying activity, which may have altered ground conditions and contributed to variability in chalk quality. The presence of backfilled or disturbed material may affect excavation behaviour, stability and suitability of material for reuse.

General Environmental Controls

- Ecological survey requirements and seasonal working restrictions
- Management of dust, noise and vibration
- Control of runoff and protection of water environment
- Management of spoil and material handling
- Temporary works, including haul roads, compounds and crane platforms, shall extend beyond the existing highway boundary, increasing the temporary environmental footprint of the work

Figure 6 - Indicative Estimate of Land Take

Establishing a confirmed red line boundary will be a critical next step in the design process, as it will influence land acquisition requirements, planning strategy, environmental impact and programme risk.

Land acquisition and access agreements represent a potential constraint on programme delivery. Delays in securing land rights, particularly where negotiations or statutory processes are required, may impact the timing of construction and overall scheme deliver.

From an option appraisal perspective, solutions that minimise excavation, reduce reliance on material stockpiling, and limit the need for large-scale lifting operations and third-party land requirements are preferred, as they reduce programme risk, environmental impact, and consenting complexity.

5. Options Summary

Four options have been developed including retained spine bridge, excavated spine bridges and a reinforced soil solution. The key differentiator between options is the extent of intervention within the chalk spine. This directly influences construction complexity, environmental impact, material handling and programme risk, making it the primary factor for contractor input. Concept General Arrangement Drawings are presented in Appendix A

Table 1 - Summary of Options

Option	Name	Superstructure Type	Description	Span Arrangement (West to East)
1	Three-span bridge over retained chalk spine	Steel-concrete composite	Three-span steel girders with a central long span over the chalk spine failure zone. Spine beyond the failure zone is retained. Superstructure supported on Pali Radice foundations.[1]	37.5m steel girder span, 65m steel girder span, 37.5m steel girder span.
2	Four-span bridge over excavated chalk spine	Steel-concrete composite	Four-span steel girders over fully or partially excavated chalk spine. Superstructure supported on piled foundations (900 – 1350mm).	30m steel girder span, 40m steel girder span, 40m steel girder span. 30m steel girder span.
3	Five-span bridge over excavated chalk spine	Precast concrete beams or steel-concrete composite	Five-span structure with either precast prestressed concrete beams or steel girders. The chalk spine shall be fully or partially excavated. Superstructure supported on piled foundations (900-1350mm).	25m span, 30m span, 30m span, 30m span 25m span.
4	Reinforced Soil Solution	N/A	Reinforced soil solution using treated chalk and geogrid reinforcement	Reinforced soil solution that is 140m in extent

[1] Reticulated network of micropiles forming a robust composite block of ground and reinforcement inclusions.

5.1.1 Three-Span Bridge Over Retained Chalk Spine

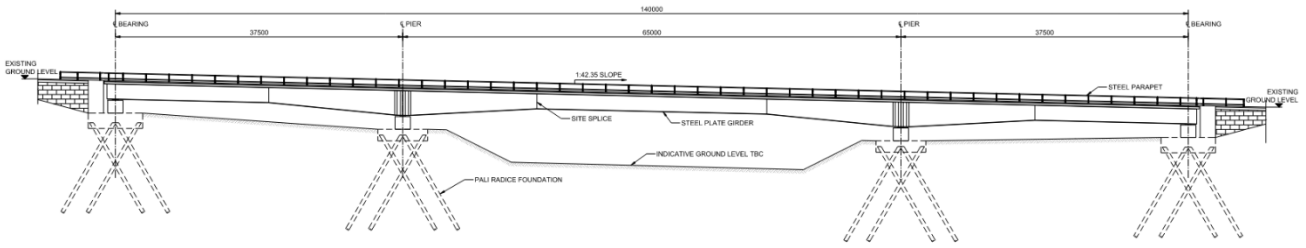


Figure 7 - Option 1: Three-Span Bridge Elevation

Option 1 comprises a three-span steel–concrete composite bridge with a central span of approximately 65 m spanning the failure zone, and two approach spans of approximately 37.5 m. Foundations are located within the retained chalk spine outside the failure zone.

This approach minimises direct intervention within the failed area but requires long spans to avoid loading weakened ground.

5.1.1.1 Superstructure

The deck comprises four weathering steel plate girders acting compositely with a 250 mm in situ concrete slab, spaced at approximately 3 m centres with transverse bracing.

A multi-girder arrangement has been selected due to its structural efficiency, redundancy and suitability for erection in a constrained environment, offering lighter individual lifts compared to ladder decks.

The span arrangement may introduce uplift effects at abutments, which will be addressed through refinement of girder geometry. Erection is assumed to be by lifting, with alternative methods such as launching to be reviewed at later stages

5.1.1.2 Foundations

The proposed foundation solution comprises Pali Radice piles, consisting of closely spaced, small-diameter, grouted and reinforced elements that improve the surrounding chalk mass and provide structural load transfer.

This system has been selected due to:

- Its suitability for installation using lightweight rigs
- Low bearing pressure and reduced plant footprint
- Ability to operate within constrained working areas
- Ground improvement benefits through pressure grouting

Conventional foundation solutions were discounted:

- Small-diameter piles are unlikely to provide sufficient capacity
- Large-diameter piles would require significant plant, working platforms and excavation, posing unacceptable stability risks near the failure zone

A grout curtain is proposed along the foundation line to control grout migration and prevent loss to exposed chalk faces, reducing environmental risk and maintaining installation integrity.

Within the failure zone, partial excavation of loose or highly disturbed chalk is proposed, followed by reprofiling and local stabilisation to form a stable working long-term condition.

5.1.2 Four-Span Bridge Over Excavated Chalk Spine

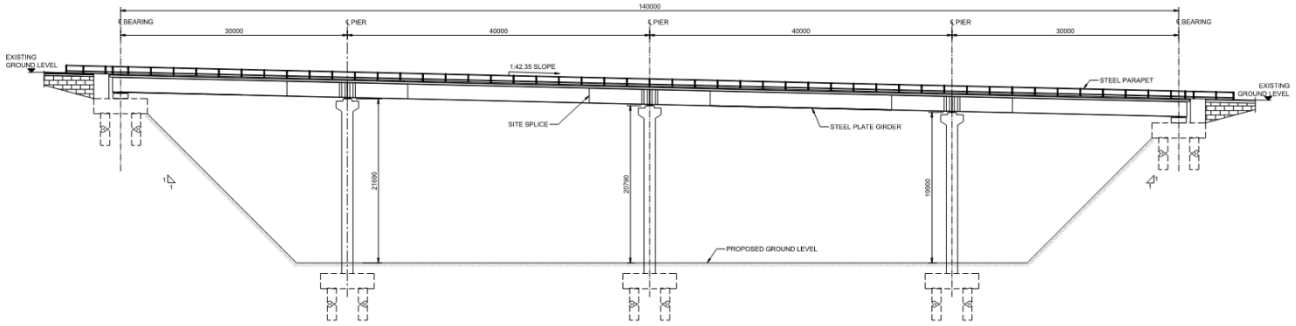


Figure 8 - Option 2: Four-Span Bridge Elevation

Option 2 adopts a four-span bridge (30–40–40–30 m) supported on conventional piled foundations following excavation of the chalk spine within the failure zone.

This configuration provides improved structural efficiency and more balanced span behaviour compared to Option 1.

5.1.2.1 Superstructure

A steel multi-girder composite deck is assumed. The regular span arrangement reduces uplift risks and improves structural performance but introduces additional piers and interfaces.

5.1.2.2 Foundations

Foundations comprise reinforced concrete piles (900–1350 mm diameter) founded in competent chalk.

Excavation is assumed within the failure zone, with full or partial removal of the spine beyond this area. Benching may be adopted to reduce excavation volume and pier heights.

This option improves geotechnical certainty and enables conventional design solutions, but introduces significant excavation, temporary works, spoil handling and working platforms for heavy plant.

5.1.3 Five-Span Bridge Over Excavated Chalk Spine

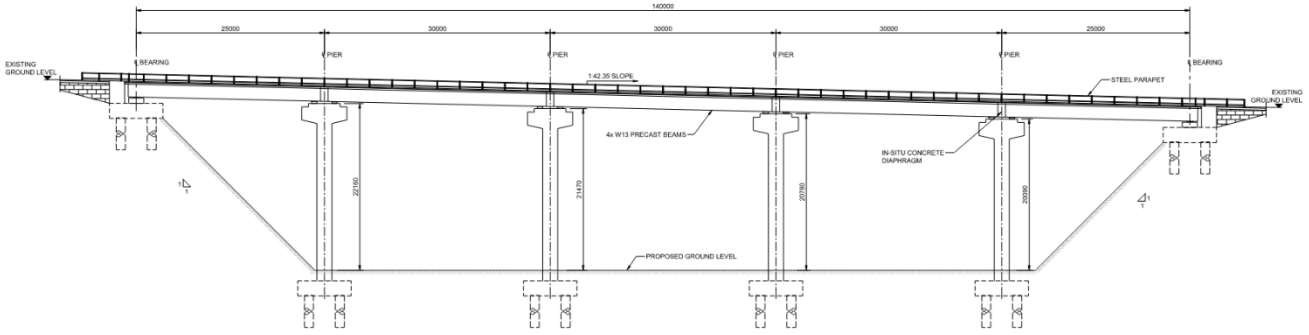


Figure 9 - Option 3: Five-Span Bridge Elevation

Option 3 is a five-span bridge (25–30–30–30–25 m) constructed following excavation of the chalk spine and formation of substructures in competent ground.

5.1.3.1 Superstructure

The reduced span lengths allow the use of precast prestressed concrete beams with a composite in situ deck. This provides a repeatable and conventional solution with good availability and quality through off-site fabrication.

However, the weight of precast units introduces transport and lifting constraints, requiring heavy craneage and confirmation of delivery routes. The increased number of spans results in more piers, bearings and interfaces, increasing construction and maintenance complexity

5.1.3.2 Foundation

As with Option 2, conventional piled foundations (900–1350 mm diameter) are adopted.

The regular layout enables repeatable foundation design and construction. Partial retention of the spine outside the failure zone may reduce excavation volumes compared to Option 2, but this is offset by the need for an additional tall pier within the failure zone.

The key trade-off is therefore reduced excavation versus increased structural complexity and construction operations.

5.1.4 Reinforced Soil Solution

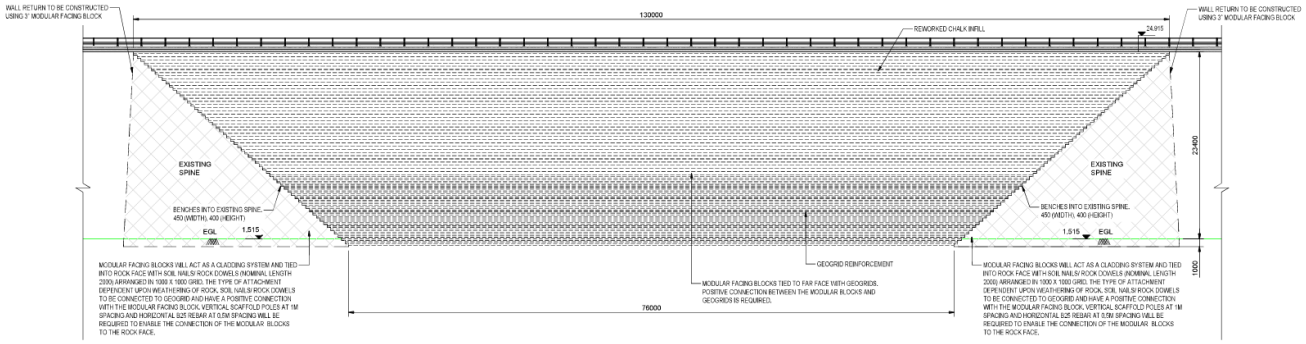


Figure 10 - Option 4 Long Section

Option 4 reconstructs the failed section of the chalk spine using treated chalk and geogrid reinforcement over approximately 140 m, removing the need for a bridge.

This solution replicates the existing landform but requires a wider footprint to achieve stability.

The absence of bearings and joints reduces long-term structural maintenance, with inspection primarily focused on drainage, facing systems and settlement.

Excavated chalk requires treatment (e.g. blending or stabilisation) to achieve suitable engineering properties. Construction will require compaction trials, controlled placement and frequent testing.

Chalk is sensitive to moisture, making the process weather-dependent and introducing programme risk.

The wider footprint (3–4 m beyond the existing spine) may require additional ground improvement outside the current alignment.

The principal challenge is the scale of earthworks:

- Large volumes of excavation, storage and re-placement
- Significant temporary land requirements
- High dependency on material handling and processing

If off-site treatment is required, additional haulage and programme impacts arise.

5.2 Capital Cost and Whole Life Cost

Capital and whole-life cost are influenced by excavation scale, structural form, foundation requirements, material processing and long-term maintenance demands. At this stage, only qualitative comparisons are presented, based on engineering judgement and alignment with the conceptual level of design.

A comparative summary of the capital and whole-life cost drivers for each option is provided below

Table 2 - Summary of Costs

Option	Capital Cost Drivers	Whole Life Cost Drivers	Overall Cost Position
Option 1	Reduced excavation and disposal requirements; fewer substructures reduce concrete and reinforcement quantities; however, the long central span increases structural demand, fabrication complexity and reliance on specialist Pali Radice foundations	Bearings, joints and weathering steel inspection requirements; retained chalk spine requires ongoing monitoring and potential intervention; constrained access arrangements increase maintenance complexity	**Moderate:** lower earthworks and substructure quantities offset by structural complexity and ongoing maintenance of retained spine
Option 2	Significant excavation, benching and disposal of chalk; multiple piers, pile caps and conventional piled foundations; increased temporary works and working platform requirements	Increased number of bearings, joints and substructures; continued requirement for maintenance at height; improved geotechnical reliability reduces long-term ground-related intervention	**Moderate–High:** higher capital cost driven by excavation and substructures, with increased maintenance demand compared to Option 1
Option 3	Similar excavation requirements to Option 2; increased number of piers and foundations significantly increases concrete, reinforcement and material quantities; potential additional lifting and logistics costs	Highest number of bearings, joints and structural interfaces; most extensive inspection and access requirements; maintenance governed by quantity of components rather than material type	**High**: highest capital and whole-life cost among bridge options due to increased structural complexity and component count
Option 4	Large-scale excavation, stockpiling, treatment and re-placement of chalk; potential off-site processing and associated haulage; increased permanent land take and wider footprint; extensive earthworks operations	No bearings or joints; reduced mechanical maintenance requirements; early-life maintenance associated with settlement; long-term performance dependent on drainage and geotechnical behaviour	**High:** significant upfront cost driven by earthworks, material processing and land requirements, partially offset by reduced long-term maintenance

5.3 Health and Safety, Risks and Constraints

Health and safety is a key consideration for the scheme due to the elevated nature of the chalk spine, the constrained working environment and the proximity to sensitive receptors, including adjacent infrastructure and environmentally designated areas. The site presents inherent risks associated with working at height and on or adjacent to potentially unstable ground, particularly within and around the existing failure zone where ground conditions remain uncertain.

A comparison of the key health and safety risks and constraints associated with each option is provided below

Table 3 - Summary of Risks

Option	Primary Risk Profile	Key Health and Safety Risks	Key Constraints / Interfaces
Option 1	Construction on retained spine with significant reliance on lifting operations and constrained working at height	Working on potentially unstable or variable chalk; restricted working width (~8.5 m due to assumed exclusion zones on shoulders of the spine); plant stability near spine edges; large crane lifts at significant radius and height; interaction between plant and personnel in constrained areas	Exclusion zones limiting plant positioning; crane likely located off-spine requiring increased radius; reliance on temporary stabilisation measures within failure zone;
Option 2	Excavation-led construction with conventional bridge works forming part of sequence	Excavation and slope stability risks during benching; need for temporary support and sequencing to maintain stability; working at height; risks associated with material handling and plant movement	Large excavation footprint; requirement for controlled sequencing of excavation and foundation works; interface with SSSI and adjacent land; requirement for safe haul routes and working platforms; proximity to HS1 infrastructure
Option 3	Excavation and multi-span construction with increased complexity and number of operations	All excavation risks as Option 2; increased lifting risks associated with heavy precast beam installation; working at height across multiple piers; higher number of construction interfaces and activities	Increased number of piers and construction fronts; transport and lifting constraints for large precast elements; greater dependency on sequencing and logistics; larger workforce and plant interaction zones
Option 4	Earthworks-led construction with large-scale material handling, treatment and placement	Large-scale excavation, stockpiling and plant interaction risks; stability of partially completed earthworks; dependency on controlled compaction and sequencing; sensitivity to weather conditions; potential degradation of material through handling	Significant temporary land take required for storage and treatment; multiple handling stages (excavate, treat, place); interface with SSSI and adjacent land; requirement for continuous monitoring and quality control during construction

For options involving retention of part of the existing spine, temporary stabilisation of the failed zone shall be required prior to or during construction, including reprofiling, local excavation, shotcrete or similar measures, to provide a safe working environment and maintain stability throughout the works.

Construction access arrangements will also need to consider security and access control, particularly for options involving excavation of the spine, where temporary or permanent changes to the landform may create additional access routes to the SSSI or railway boundary.

5.4 Construction

Construction is constrained by:

- Elevated spine geometry and limited working width
- Uncertain ground conditions
- Restricted access to both sides of the spine
- Environmental constraints and proximity to infrastructure

For option development, it is assumed that Galley Hill Road must accommodate SV100 loading in accordance with the UK National Annex to BS EN 1991-2. This forms the basis for both permanent bridge design and the assessment of construction transport loads.

Structural elements are assumed to be limited to approximately 30 m in length, reflecting site access constraints. As axle loads for these vehicles are comparable to SV100 loading, it is assumed that the chalk spine could accommodate transport loads during construction, based on engineering judgement.

Method of Transport	Max Width (metres)	Max Rigid Length (metres)	Max Laden Weight (tonnes)	Max Axle Weight (tonnes)
Free movement	3.0	18.75	44	11.5
Police to be informed – escort required	5.0	30.0	150	16.5
VR1 Permit (at least 3 months notice)	6.1	30.0	150	16.5
Special Order (at least 3 months notice)	More than 6.1	More than 30.0	> 150	–

Figure 11 Extract from: British Constructional Steelwork Association (BCSA) publication 51/10 – Bridges: A Practical Approach to Design and Efficient Fabrication and Construction (2010)

This assumption will require confirmation at later design stages through detailed assessment of ground conditions, temporary loading and construction methodology.

Craneage is unlikely to be feasible directly from the spine due to width and bearing capacity constraints. Superstructure erection is therefore expected to require lifting from adjacent areas at ground level.

Given the overall length of the structure, multiple crane positions are likely to be required along its alignment to facilitate staged erection.

In the absence of viable craneage from the spine, crane locations would need to be established within the adjacent northern industrial area. Whilst craneage within the SSSI may be technically feasible, this is not considered preferable due to environmental constraints and consenting requirements.

Alternatively, large mobile cranes could theoretically be operated from the base of the spine; however, this would necessitate the provision of a substantial working corridor to enable crane movement and set-up, resulting in a significant increase in land take and associated environmental, logistical and stakeholder impacts.

Given that the viability of an incremental launching (IL) solution remains uncertain at this stage, a conservative assumption has been made that a lifted construction methodology will be required for the purposes of developing the current design and programme. This assumption will be reviewed and refined as part of the next stage of design. Incremental launching remains a potential alternative but has not been demonstrated as feasible at this stage.

Table 4 - Construction Considerations

Option	Construction Approach	Key Construction Challenges	Temporary Works / Logistics	Key Programme Considerations
Option 1	Construction on or adjacent to the retained spine using Pali Radice foundations and long-span steel erection	Working on potentially less competent ground; limited stand-off from spine edges; partial excavation and reprofiling of failed zone required; 65 m central span likely to require large crane lifts and in-air bolted splicing	Working platforms on the spine; local excavation required to accommodate superstructure depth and piling rig platform requirements; cranes positioned off the spine due to limited width on the crest; launching may be an alternative subject to further assessment	Long lead-in and procurement requirements for large prefabricated components; lifting strategy and crane platform design are likely to be critical programme drivers
Option 2	Substantial excavation and benching of the chalk spine followed by conventional piled foundations and steel bridge construction	Excavation stability and sequencing; management of large volumes of excavated chalk; increased number of substructures and construction interfaces; steel spans likely to require large crane lifts and in-air bolted splicing	Temporary support measures during excavation; stockpiling, handling and disposal of excavated chalk; working platforms for heavy piling rigs and cranes; multiple working areas required for excavation, piling and bridge erection	Programme influenced by excavation duration, material handling and disposal, and coordination of piling and superstructure erection
Option 3	Similar to Option 2, but with shorter spans and either precast prestressed concrete beams or steel elements	Increased number of repetitive construction activities and interfaces; heavy lifting of individual precast units if concrete option adopted; safe transport and erection of 30 m units must be confirmed	Similar excavation and temporary works requirements to Option 2; temporary works for continuity diaphragms and staged construction	Increased number of operations and lifting events may extend construction duration compared with Option 2
Option 4	Earthworks-led construction excavation, storage, treatment and re-placement of chalk with geogrid reinforcement	Large-scale handling of site-won chalk; sensitive to weather; risk of chalk degradation through handling; wider footprint may require local excavation/replacement or ground improvement outside the existing spine	Significant temporary land required for stockpiling, treatment and processing; compaction trials and material assessment required; temporary works needed where cladding is required degradation	Programme sensitive to treatment methodology, compaction trials, weather, and staged earthwork build-up

5.5 Access and Logistics

The site is constrained by limited access between the northern industrial area and the SSSI to the south. Access to the northern side of the spine is provided via Manor Way, an industrial road off Galley Hill Road, which is constrained by narrow carriageway widths and tight turning radii and may require modification to accommodate construction traffic and logistics.

Figure 12 Land use constraining Galley Hill Road

Access to the southern side of the chalk spine is restricted by the presence of the NR/HS1 railway infrastructure. Access beneath the existing HS1 structure is limited by vertical clearance constraints and would require agreement with HS1 / Network Rail and compliance with their asset protection and approval processes.

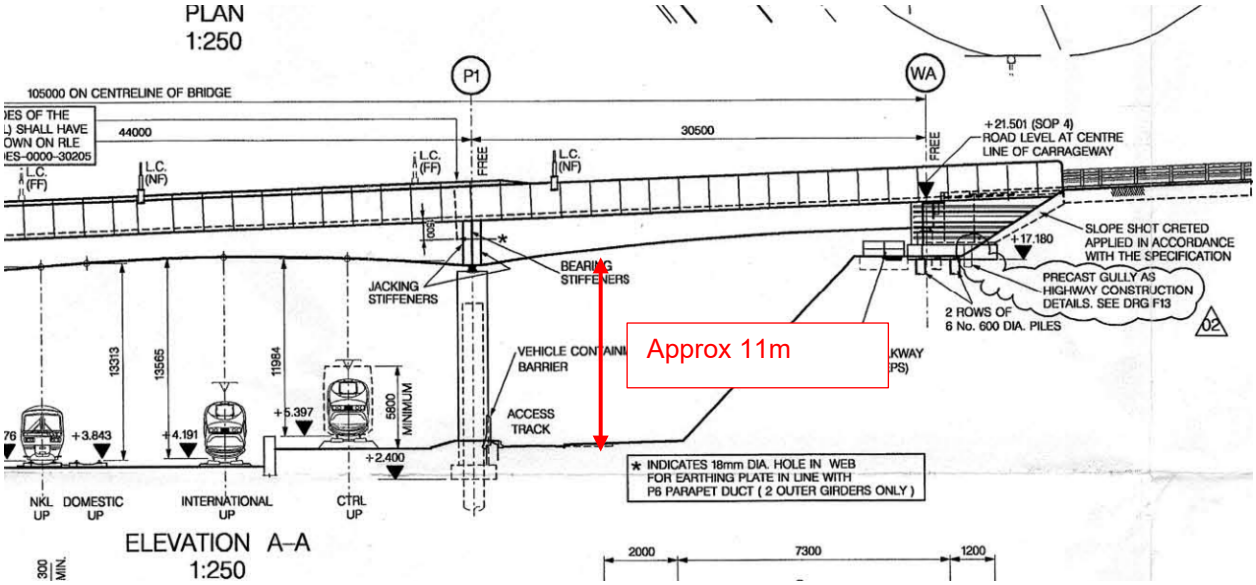


Figure 13 - Extract from detailed design drawing of West span of High Speed 1 Bridge showing allowable height of access.

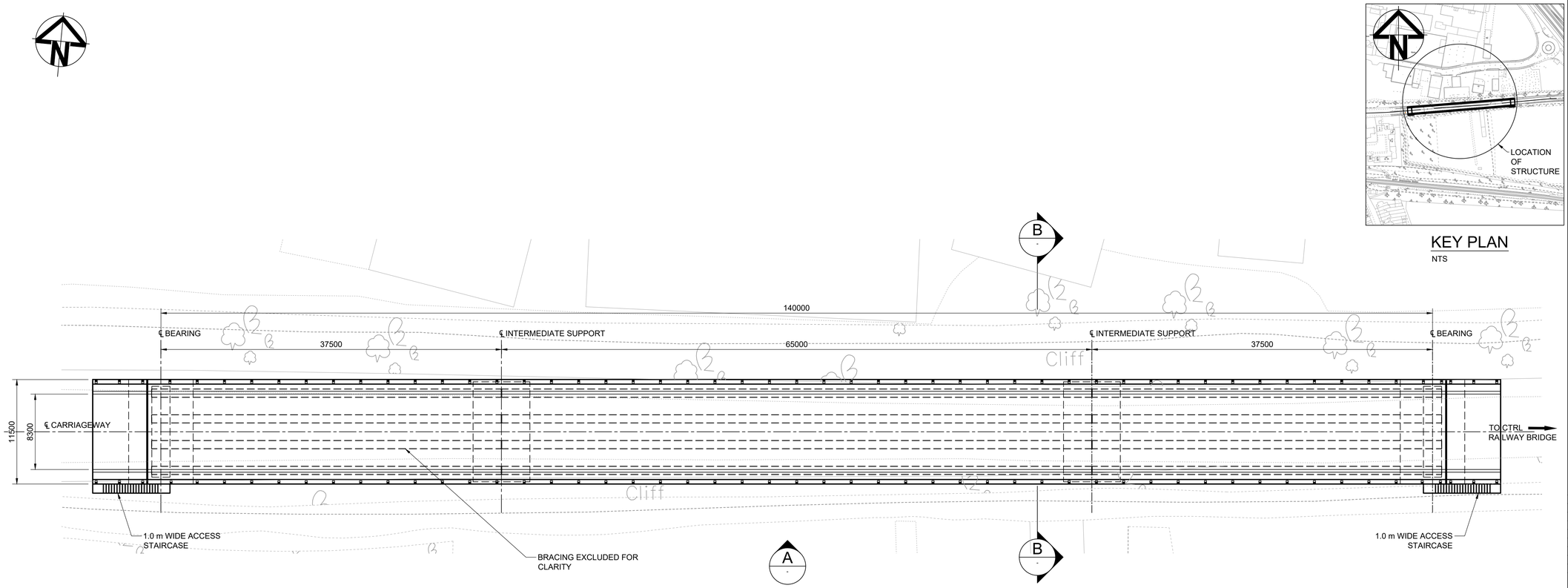
Consideration must be given to the volume of chalk requiring excavation and the associated requirements for handling, storage and disposal or reuse. Given the constrained nature of the site, available space for stockpiling and processing is likely to be limited.

Where reuse of site-won chalk is proposed, material may require treatment (e.g. with lime, cement or blending with granular material) to achieve suitable engineering properties. Excess material may need to be transported off site to licensed landfill or processing facilities, resulting in increased haulage, associated environmental impacts and programme implications.

At this stage, the road remains closed following the 2023 failure, and construction is therefore assumed to be undertaken under full road closure conditions. No specific temporary traffic management measures beyond closure have been defined at this stage. Traffic management requirements for construction and reopening will be developed and agreed with the Overseeing Organisation Project Manager at the next stage of design.

Appendix A

Drawings



PLAN

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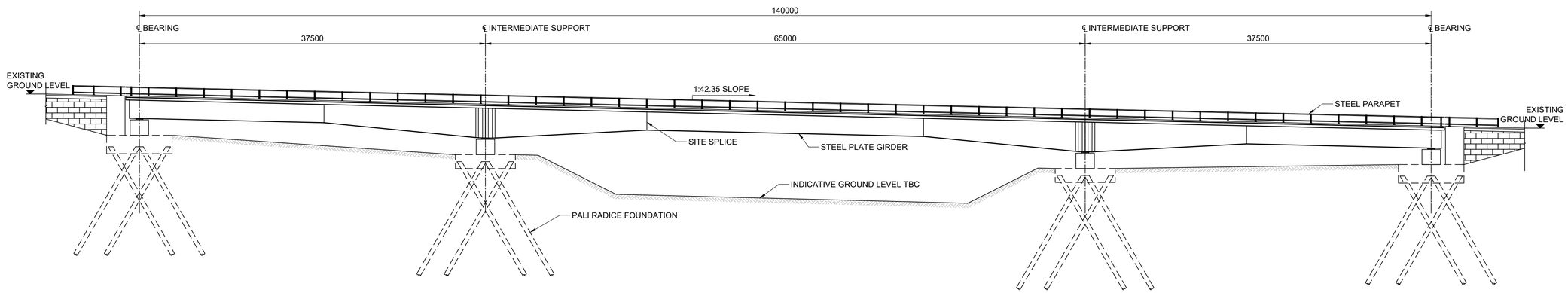

A

ELEVATION

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KEY PLAN

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NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
2. DO NOT SCALE FROM THIS DRAWING.
3. LAYOUT SHOWN IS INDICATIVE ONLY FOR OPTION DEVELOPMENT PURPOSES.
4. NO DETAILED DESIGN HAS BEEN UNDERTAKEN AT THIS STAGE.
5. EXTENTS BASED ON CURRENT TOPOGRAPHICAL AND PRELIMINARY GROUND INFORMATION.
6. ALL ELEMENT SIZES AND DIMENSIONS ARE INDICATIVE ONLY AND HAVE NOT BEEN SUBJECT TO FULL ANALYSIS OR VERIFICATION AT THIS STAGE.
7. GIRDER DEPTH IS BASED ON A SPAN/DEPTH RATIO OF L/20 AT PIERS AND L/30 AT MIDSPAN.
8. ALL LEVELS, DIMENSIONS AND TIE-INS TO BE CONFIRMED AT DETAILED DESIGN STAGE.

Rev	Date	Description	Drawn	Check	Approv
01	05JUN26	OPTION SELECTION	JC	KA	LK

Kent County Council

kent.gov.uk

Site

GALLEY HILL ROAD
GRAVESEND, DA119BH

Client

KENT COUNTY COUNCIL
COUNTY HALL
MAIDSTONE, KENT
ME14 1XQ
Phone -
Fax -

ARCADIS Design & Consultancy for natural and built assets

Registered office:
80 Fenchurch Street
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Coordinating office:
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London EC3m 4BY
Tel: 44 (0) 20 7812 2000

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GALLEY HILL ROAD
OPTION 1 BRIDGE SOLUTION
PLAN AND ELEVATION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK01-1
Revision: 01

100mm on Original

Print Date: 2026-06-10 18:20:22

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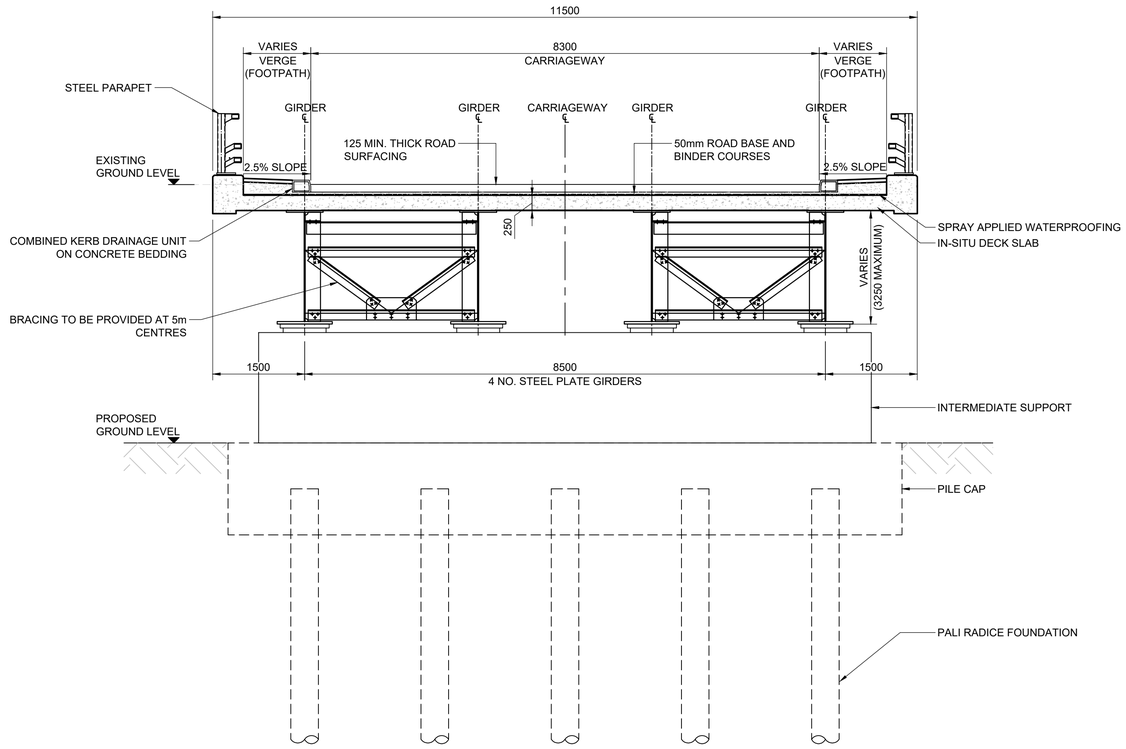

B - SECTION

SCALE 1: 50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
2. DO NOT SCALE FROM THIS DRAWING.
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Rev	Date	Description	Drawn	Check	Approv
01	10JUN26	OPTION SELECTION	JC	KA	LK

Kent County Council

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Site

GALLEY HILL ROAD
GRAVESEND, DA119BH

Client

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MAIDSTONE, KENT
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Fax -

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GALLEY HILL ROAD
OPTION 1 BRIDGE SOLUTION
SECTION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK01-2
Revision: 01

100mm on Original

Print Date: 2026-06-10 18:20:43

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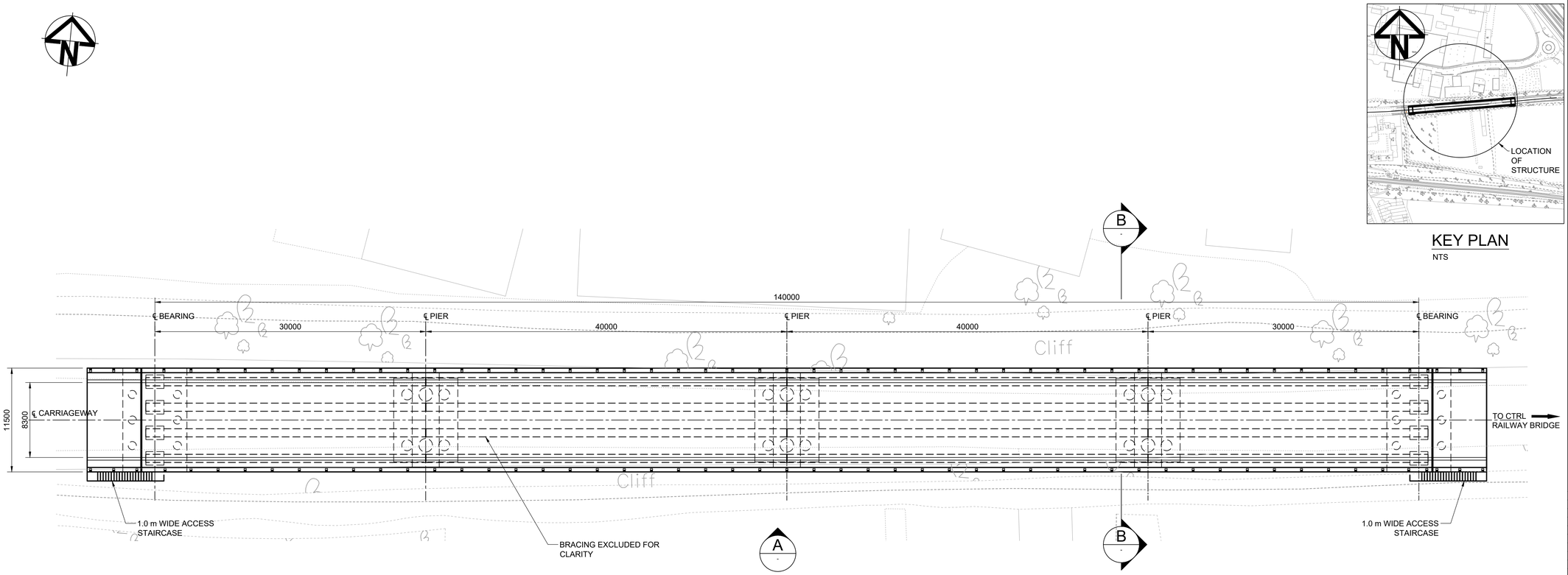
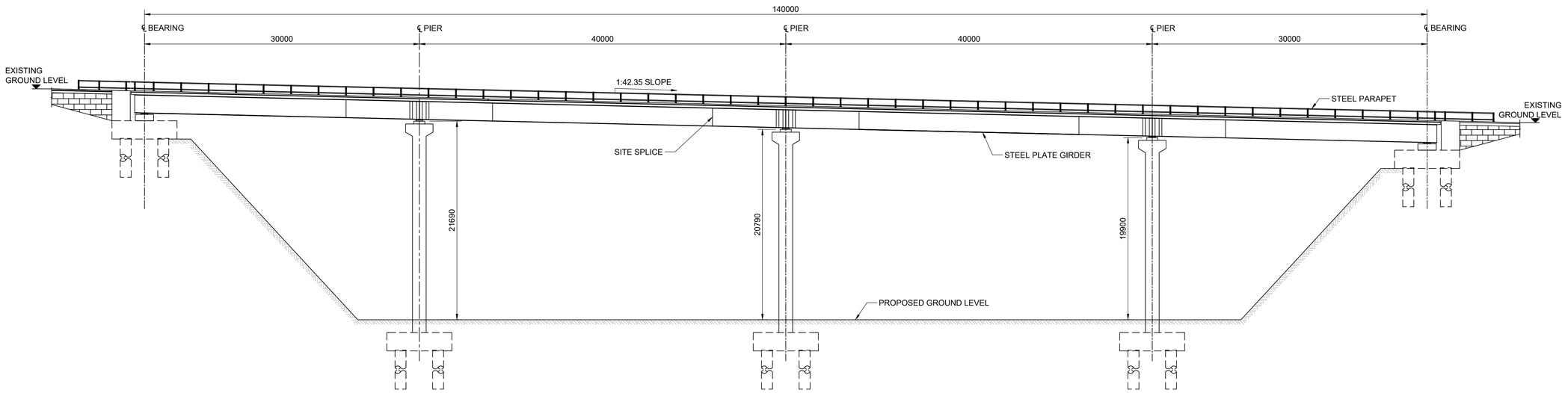


PLAN
SCALE 1:250



A ELEVATION
SCALE 1: 250

KEY PLAN
NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
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8. NEW BOUNDARY MAY BE REQUIRED TO MAINTAIN ACCESS LIMITATIONS TO SSSI.
9. ALL LEVELS, DIMENSIONS AND TIE-INS TO BE CONFIRMED AT DETAILED DESIGN STAGE.

Rev	Date	Description	Drawn	Check	Approv
01	10JUN26	OPTION SELECTION	JC	KA	LK

Kent County Council

Site
GALLEY HILL ROAD
GRAVESEND, DA119BH

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GALLEY HILL ROAD
OPTION 2 BRIDGE SOLUTION
PLAN AND ELEVATION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK02-1
Revision: 01

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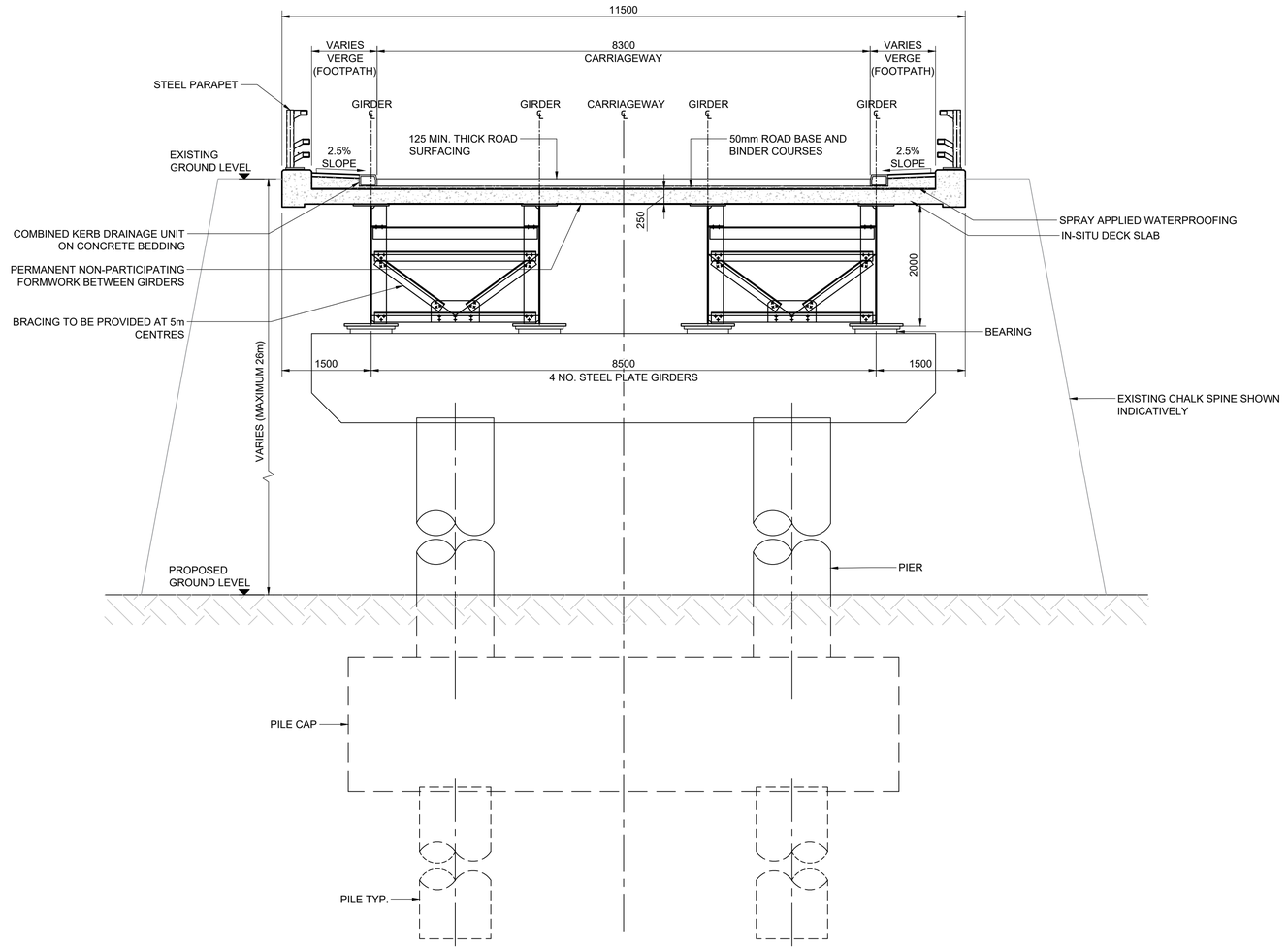

B
SECTION
SCALE 1: 50

NOTES:

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Rev	Date	Description	Drawn	Check	Approv
01	10JUN26	OPTION SELECTION	JC	KA	LK

Kent County Council

Site

GALLEY HILL ROAD
GRAVESEND, DA119BH

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GALLEY HILL ROAD OPTION 2 BRIDGE SOLUTION SECTION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

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Revision: 01

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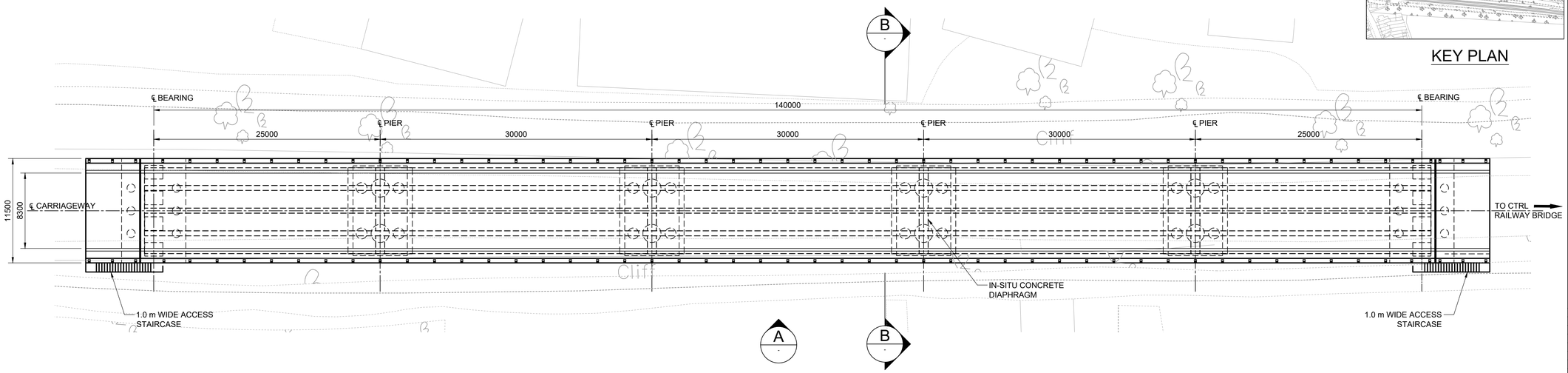
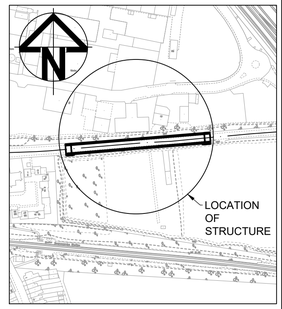


PLAN

SCALE 1:250



KEY PLAN

NOTES:

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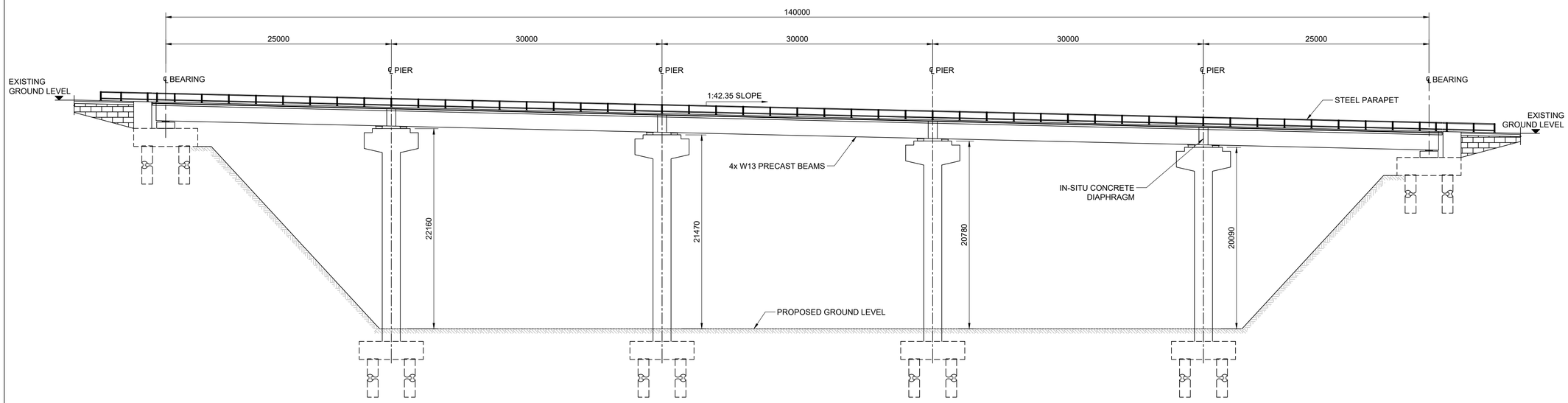

A
-
ELEVATION

SCALE 1: 250

01	10JUN26	OPTION SELECTION	JC	KA	LK
Rev	Date	Description	Drawn	Check	Approv

Kent County Council

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Site

GALLEY HILL ROAD
GRAVESEND, DA119BH

Client

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ARCADIS Design & Consultancy for natural and built assets

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GALLEY HILL ROAD OPTION 3 BRIDGE SOLUTION PLAN AND ELEVATION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK03-1

Revision: 01

100mm on Original

Print Date: 2026-06-10 18:16:44

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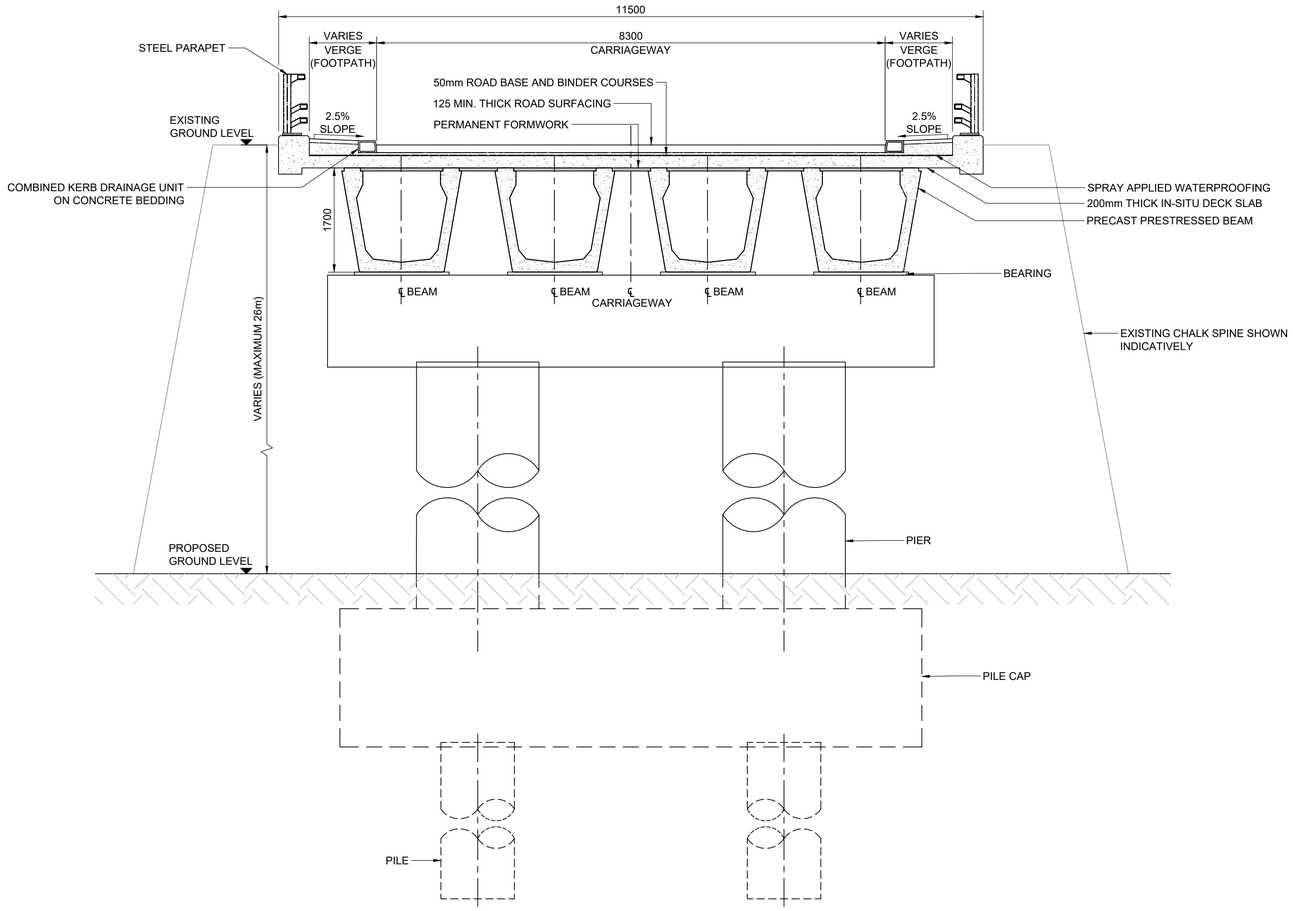

B - SECTION
SCALE 1: 50

NOTES:

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Rev	Date	Description	Drawn	Check	Approv
01	10JUN26	OPTION SELECTION	JC	KA	LK

Kent County Council

Site
GALLEY HILL ROAD
GRAVESEND, DA119BH

Client
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MAIDSTONE, KENT
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Fax -

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Coordinating office:
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GALLEY HILL ROAD
OPTION 3 BRIDGE SOLUTION
SECTION

Designed	C. ILIFF	Signed CI	Date 10JUN26
Drawn	J. CHINNASAMY	Signed JC	Date 10JUN26
Checked	K. AR	Signed KA	Date 10JUN26
Approved	L. KENNELLY	Signed LK	Date 10JUN26
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:
For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK03-2
Revision: 01

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Print Date: 2026-06-10 18:17:08

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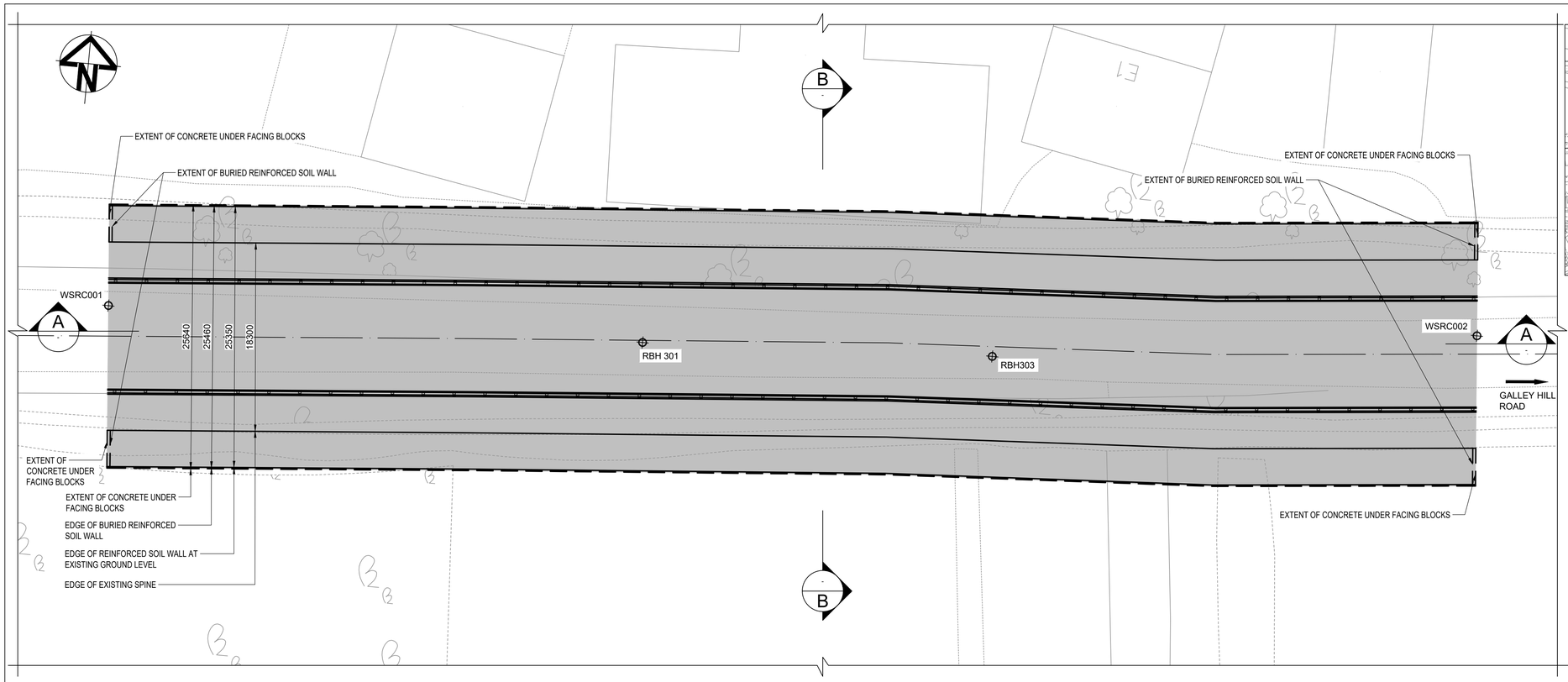
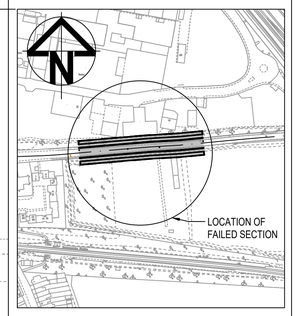


PLAN VIEW

SCALE 1:250



KEY PLAN

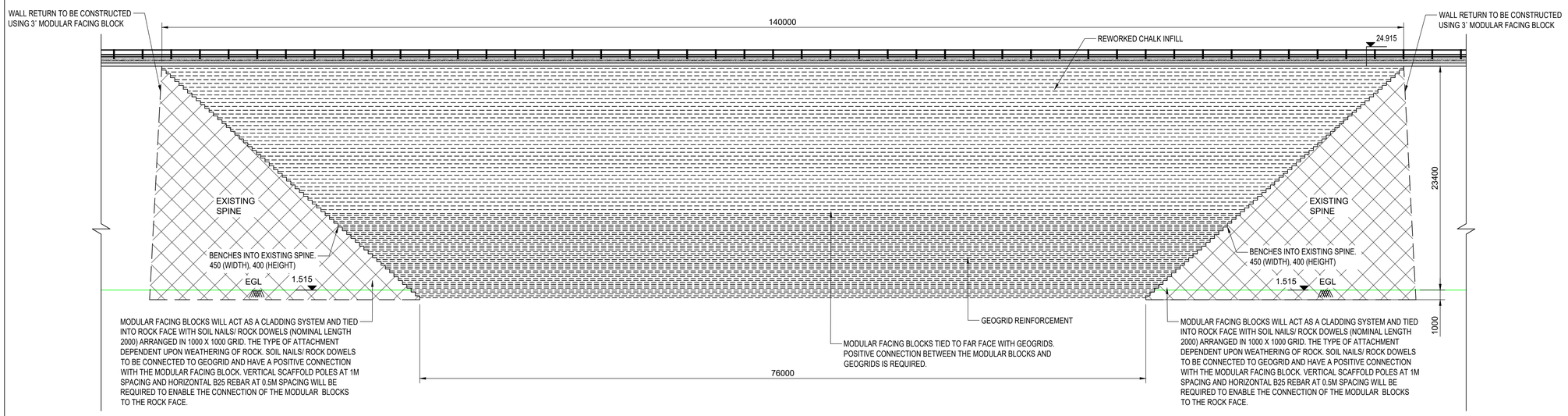
NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
2. DO NOT SCALE FROM THIS DRAWING.
3. WELL-GRADED GRANULAR MATERIAL TO HAVE LESS THAN 10% FINE.
4. ROAD MAKEUP (ASSUMING FULL DEPTH OF CONSTRUCTION OF A FULLY FLEXIBLE PAVEMENT WITH 5% CBR VALUE. ASSUMED COUNT POINT: 80930 TAKEN FORM DEPARTMENT FOR TRANSPORT, AADT: 12661, 7% HGV, COUNT IN 2023):
   - 40mm SURFACE COURSE
   - 60mm BINDER
   - 200mm BASE
   - 200mm TYPE 1 SUBBASE
   - 250mm CAPPING
5. CHALK INFILL SHALL BE COMPACTED/STABILISED AS REQUIRED.

LEGEND:

- BOREHOLE LOCATION
- SOIL REINFORCEMENT
- SOIL REINFORCEMENT ARRANGEMENT AT LOCATION OF COMPETENT ROCK
- GEOGRID REINFORCEMENT
- EXISTING GROUND LEVEL



A - LONG SECTION A - A

SCALE 1: 250

BORE HOLE DETAILS		
BORE HOLE POINT	EASTING (m)	NORTHING (m)
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RBH301	560689.340	174875.250
RBH303	560723.320	174877.060
WSRC002	560770.027	174883.453

Rev	Date	Description	Drawn	Check	Approv
V01	13FEB25	FIRST DRAFT	KHW	EA	HDS

Kent County Council

Site

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GRAVESEND, DA119BH

Client

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London EC3M 4BY
Tel: 44 (0) 20 7812 2000

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GALLEY HILL ROAD
OPTION 4 REINFORCED SOIL SOLUTION
PLAN AND ELEVATION

Designed	S. CHIU	Signed SC	Date 13FEB25
Drawn	KH. WONG	Signed KHW	Date 13FEB25
Checked	E. ADALI	Signed EA	Date 13FEB25
Approved	HD. SCHREINER	Signed HDS	Date 13FEB25
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:

For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK04-1

Revision: V01

100mm on Original

Print Date: 2026-06-10 18:14:20

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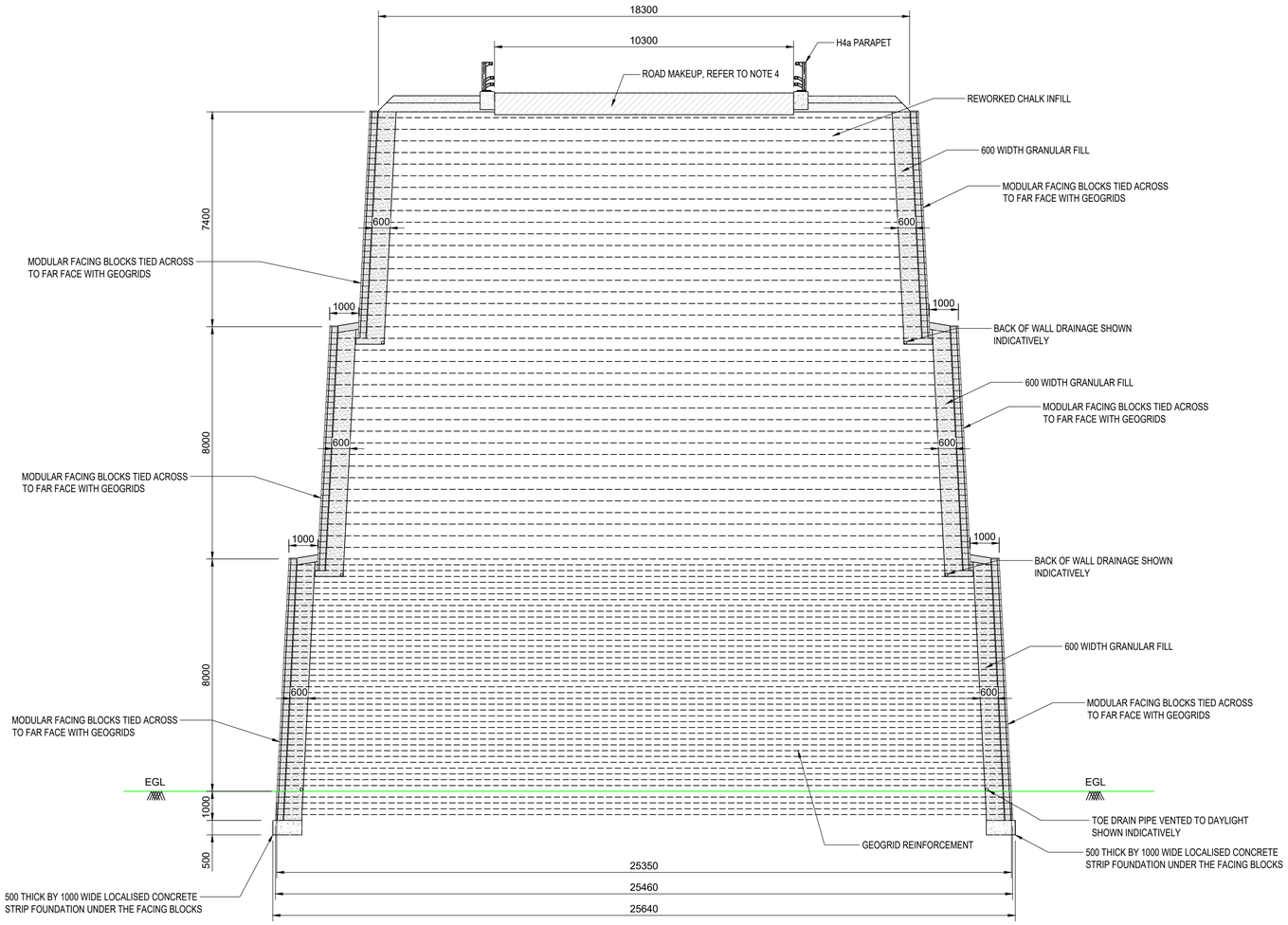

B - SECTION B - B

SCALE 1: 100

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
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   - 40mm SURFACE COURSE
   - 60mm BINDER
   - 200mm BASE
   - 200mm TYPE 1 SUBBASE
   - 250mm CAPPING
5. CHALK INFILL SHALL BE COMPACTED/STABILISED AS REQUIRED.

LEGEND:

- GRANULAR FILL
- REWORKED CHALK INFILL
- CONCRETE
- ROAD MAKEUP, REFER TO NOTE 4
- 3` FACING BLOCK INFILLED WITH GRANULAR FILL
- GEOGRID REINFORCEMENT
- EXISTING GROUND LEVEL

Rev	Date	Description	Drawn	Check	Approv
V01	13FEB25	FIRST DRAFT	KHW	EA	HDS

Kent County Council

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GALLEY HILL ROAD
OPTION 4 REINFORCED SOIL SOLUTION SECTION

Designed	S. CHIU	Signed SC	Date 13FEB25
Drawn	KH. WONG	Signed KHW	Date 13FEB25
Checked	E. ADALI	Signed EA	Date 13FEB25
Approved	HD. SCHREINER	Signed HDS	Date 13FEB25
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S3	Project Number:	30334298

Suitability Description:

For Information

Drawing Number: 30334298-ARC-PRJ-DWG-SK04-2

Revision: V01

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Print Date: 2026-06-10 18:14:52

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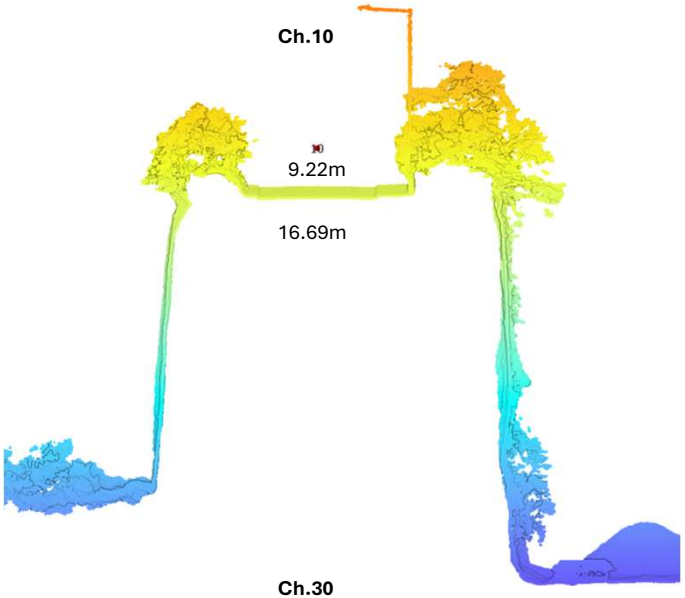
Appendix B

Photogrammetry Cross-Sections

Ch.10



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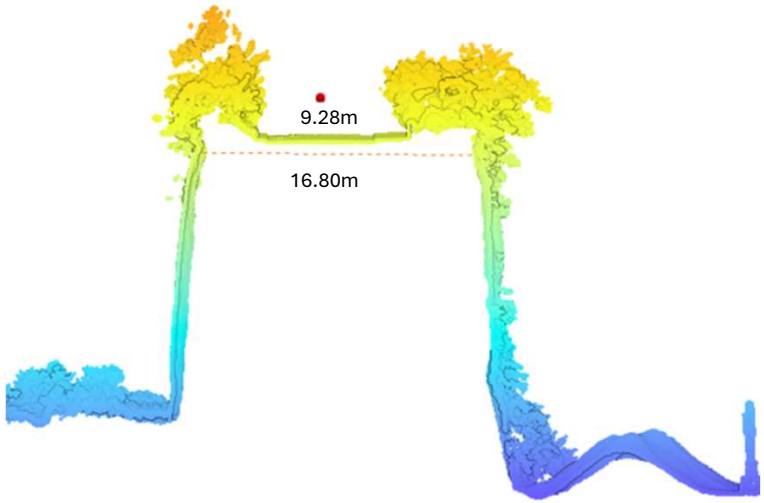

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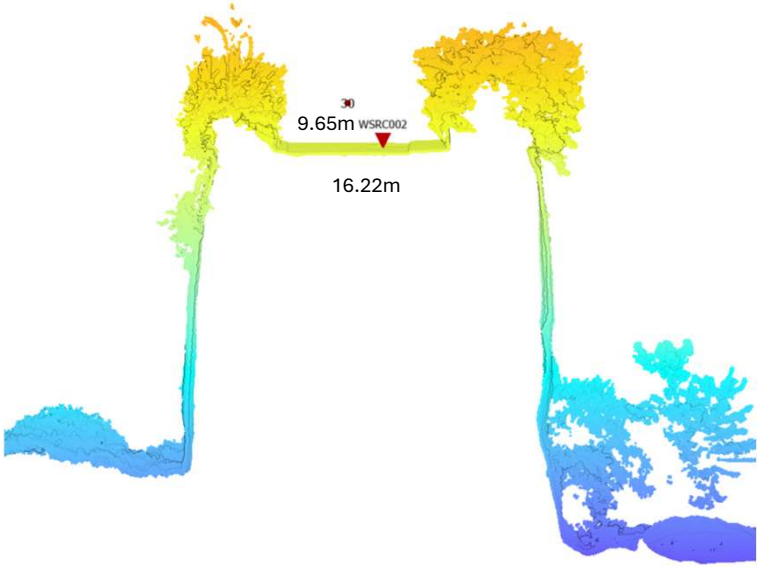
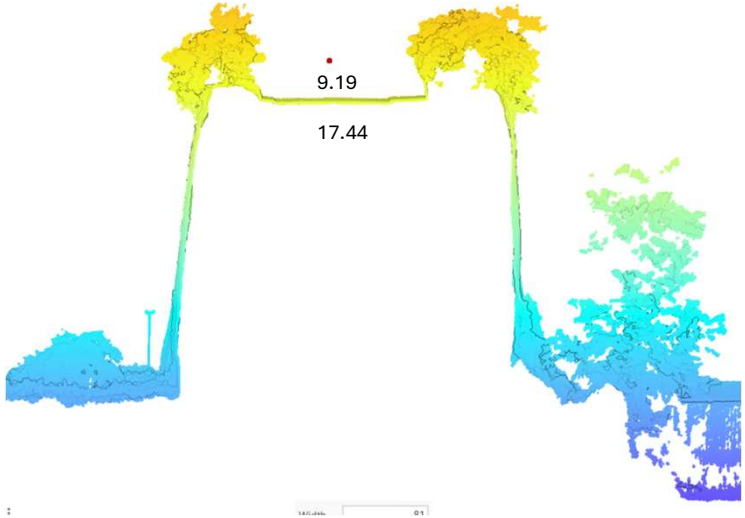


Ch.40



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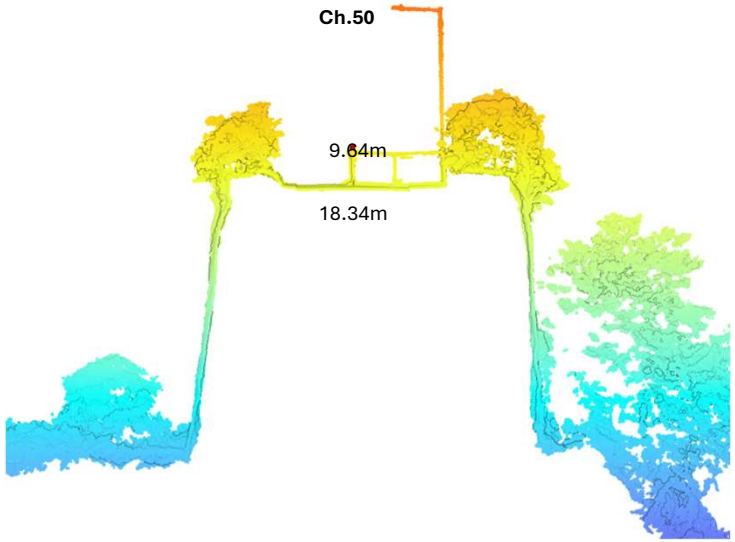
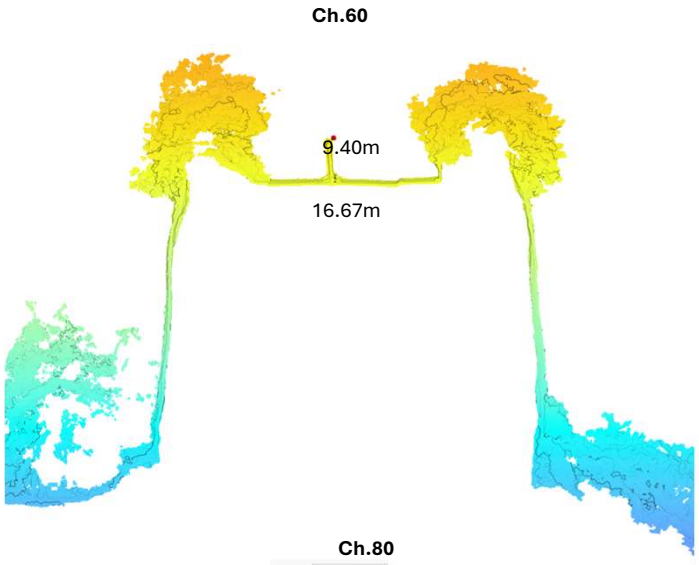
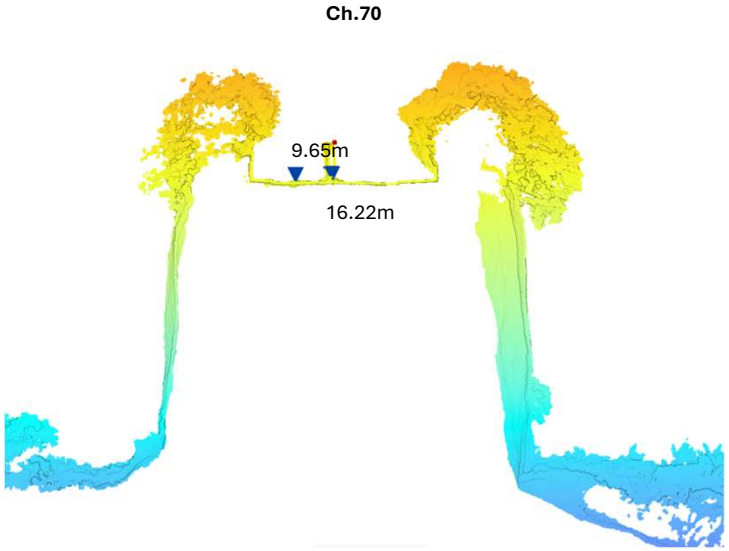
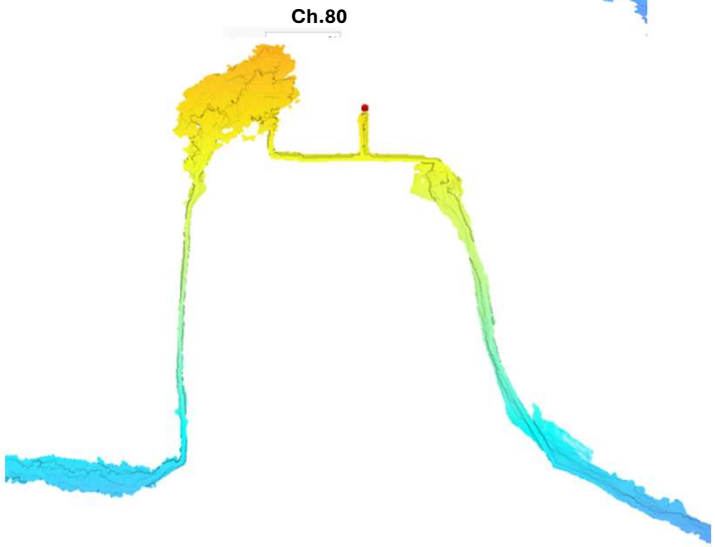


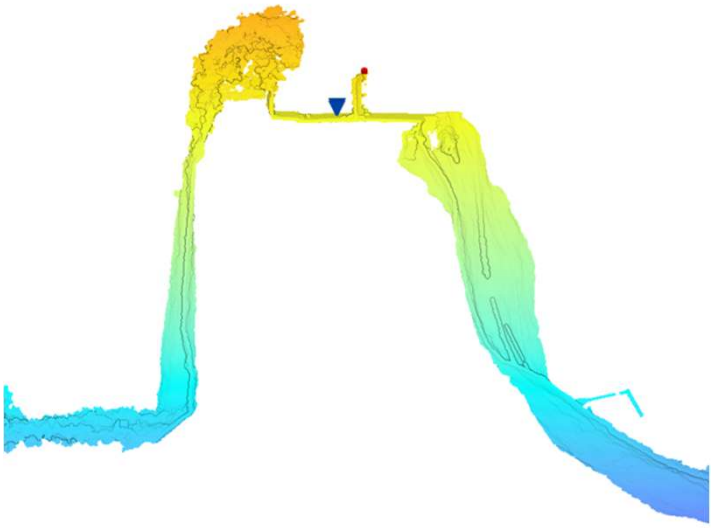




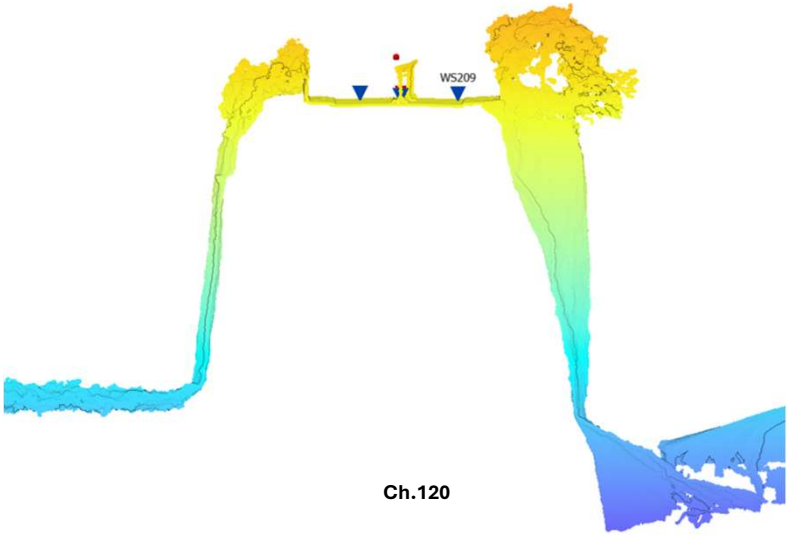


Sections Cut From July 2023 Photogrammetry - Do Not Scale

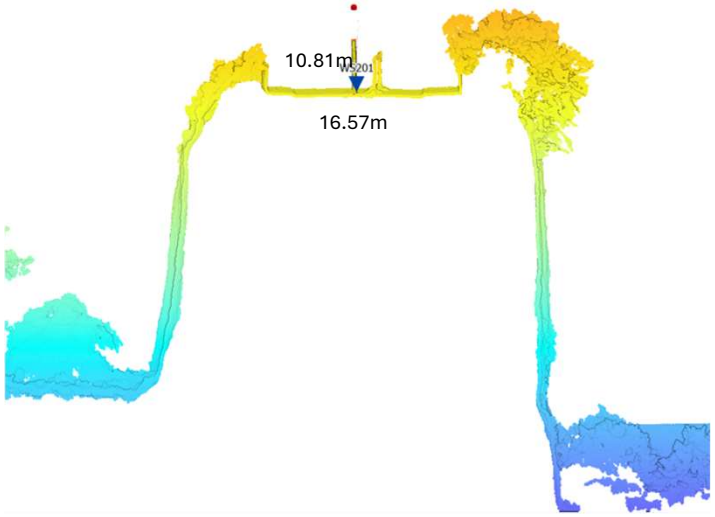
Ch.90



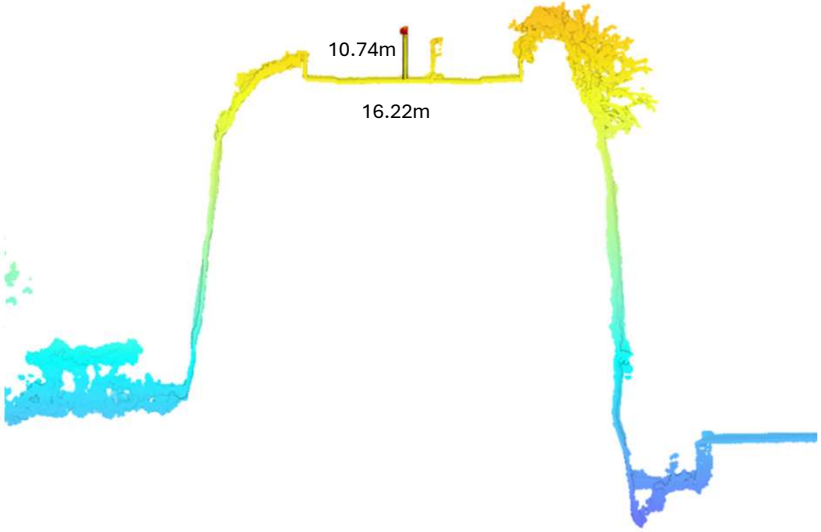
Ch.100



Ch.110



Ch.120



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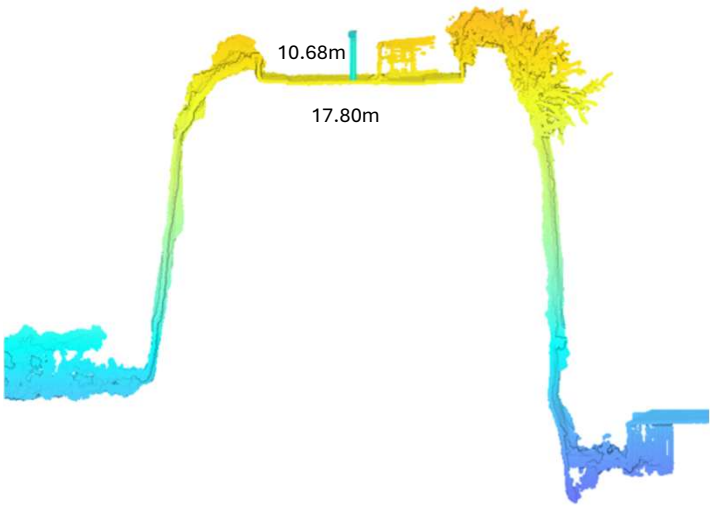
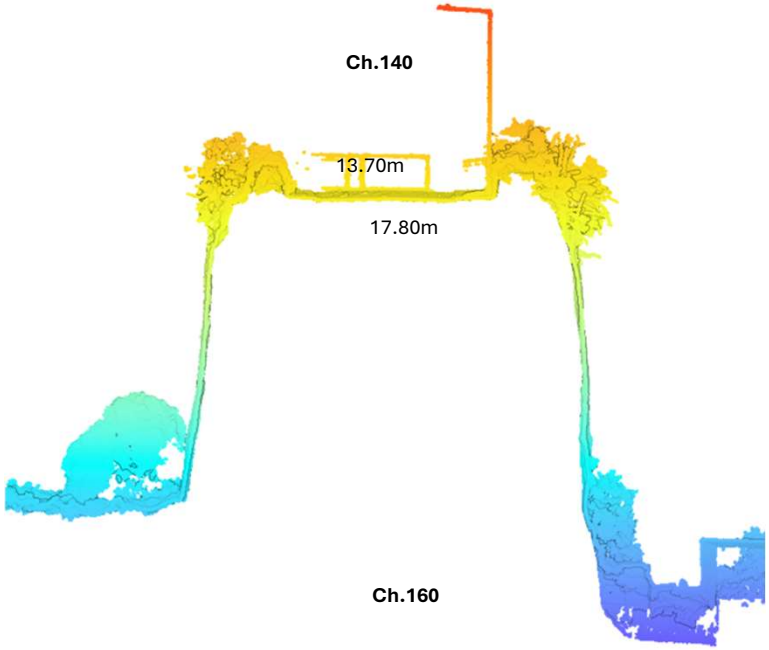
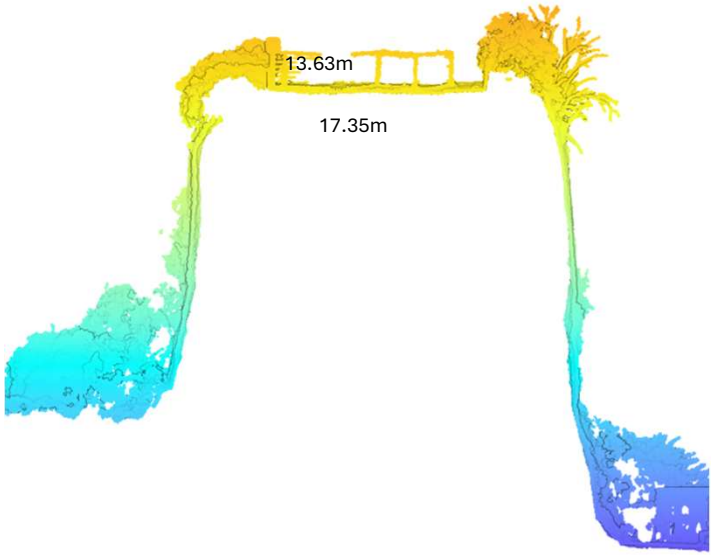
Ch.130



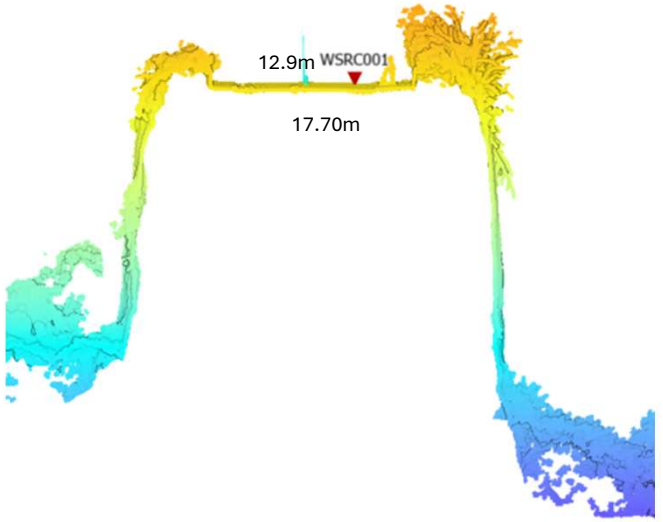
Ch.140



Ch.150



Ch.160



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