

JPG Limited

Higham Lane Retaining Wall, Dodworth

Options Report

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Document Control Sheet

Project 2971
Higham Lane Retaining Wall, Dodworth
Options Report

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1 GENERAL INFORMATION

Name of Scheme: Higham Lane Retaining Wall, Dodworth

1.1 Introduction

The site is located approximately 3km to the west of Barnsley town centre where Higham Lane intersects and crosses over the M1 motorway. The approximate centre of the site is located at NGR 431460, 406470. A location plan, aerial photograph and proposed layout for the wider site and retaining wall are presented in Appendix A.

The site currently comprises farmland adjoining the M1 motorway and is proposed to be developed for industrial units/warehousing. The wider proposals comprise two large industrial buildings with service yards, car parking space and soft landscaping areas. A retaining wall is required to retain the engineered fill forming the development platform for the northern building, which is henceforth referred to as Unit 1 in this report.

The length of the retaining wall is approximately 157m, including an 11m return wall, and the retained height varies from approximately 2.1m to 6.3m. The horizontal distance between the front of the retaining wall and the M1 carriageway is approximately 21m.

A formal optioneering assessment has not yet been undertaken. The following options will be considered in this report:

- Option 1: Sheet pile retaining wall.
- Option 2: Reinforced concrete bored pile wall.
- Option 3: Reinforced concrete retaining wall.
- Option 4: Gabion/gravity retaining wall.
- Option 5: Reinforced earth retaining wall.

1.2 Consultations and Requirements

Ongoing consultations have been undertaken with the Highways Department at Barnsley Metropolitan Borough Council regarding the wider Higham Lane scheme.

A proposed electric cable diversion will be required. It is currently proposed to construct the retaining wall before the diversion is undertaken. An easement of 2m on either side of the proposed route will be required, which can be accommodated. The proposed diversion route is provided in Appendix A.

1.3 Geology

The geology of the site is shown on the British Geological Survey (BGS) Sheet 87 Barnsley (solid and drift geology) at 1:50,000 scales.

A large area of worked ground, associated with the M1 motorway, is indicated along the north-eastern boundary of the site. Further made ground and infilled ground associated with historical spoil heaps and historical opencast coal sites are indicated approximately 30m to the south-west and 70m to the north-east of the site respectively.

No superficial deposits are recorded on the site.

The bedrock geology comprises the Pennine Middle Coal Measures (PMCM) Formation consisting of undifferentiated mudstone, siltstone, sandstone and coal seams. The overall dip of the solid geology is shown as 5 degrees to the north-east. The hill in the south of the wider site corresponds to a sandstone unit shown to outcrop on the geological maps in this part of the site.

No faults are recorded on the site.

The risk of encountering shallow mineworks is low and the 2025 site-specific ground investigation did not indicate the presence of shallow mineworkings.

1.4 Loading

Surcharge loading from the Unit 1 building ground floor slab is likely to be applicable to the retaining wall. This is currently to vary between 10kN/m² and 30kN/m². Structural column loading from the Unit 1 building superstructure will not be applied to the retaining wall.

High and/or heavy load route requirements are not applicable; the minimum offset between the retaining wall and M1 carriageway is approximately 21m. Furthermore, there is no vehicular access to the back of the retaining wall.

1.5 Environment

The site is currently greenfield and therefore sustainable development goals are applicable. The environmental aspects of each option are assessed in Appendix C and D.

1.6 Land and Property

The site is constrained by the National Highways land boundary and M1 carriageway to the north-east and by Higham Lane to the west. Residential buildings are situated to the south of the proposed Unit 1 building.

2 STRUCTURE OPTIONS

2.1 Description of Proposed Structure Options

The following options have been considered for the Higham Lane Retaining Wall.

- Option 1: Sheet pile retaining wall.

This option comprises a steel sheet pile embedded retaining wall constructed along the boundary of the Unit 1 building. A cantilever wall would be likely be feasible up to 3m retained height with anchorage required for the larger retained heights up to 6.2m. This option is illustrated in Drawing 2971-DWG-002.

- Option 2: Reinforced concrete bored pile wall.

This option comprises a reinforced concrete embedded bored piled retaining wall constructed along the boundary of the Unit 1 building. A cantilever wall would likely be feasible up to 3m to 4m retained height with anchorage required for the larger retained heights up to 6.2m. This option is illustrated in Drawing 2971-DWG-003.

- Option 3: Reinforced concrete retaining wall.

This option consists of a reinforced concrete retaining stem wall, which would likely require piled foundations to maintain a slender aspect ratio. This option is illustrated in Drawing 2971-DWG-004.

- Option 4: Gabion/gravity retaining wall.

This option consists of a gabion wall, or similar gravity wall. This would likely require a width that is approximately equal to 2/3 of the retained height to maintain stability. Due to the limited load-carrying capacity of this structural form and high potential settlement, this type of all would need to be constructed outside the building footprint. This option is illustrated in Drawing 2971-DWG-005.

- Option 5: Reinforced earth retaining wall.

This option consists of a reinforced earth retaining wall, which would comprise granular fill with layers of geogrids. This would likely require a width that is approximately 0.7 times the retained height to maintain internal and external stability. Due to the limited load-carrying capacity of this structural form and high potential settlement, this type of all would need to be constructed outside the building footprint. This option is illustrated in Drawing 2971-DWG-006.

2.2 Capital Cost and Whole Life Cost

Refer to Appendices C and D for a comparison of all the options considered.

2.3 Appearance

Refer to Appendices C and D for a comparison of all the options considered.

2.4 Sustainability and Use of Natural Resources

Refer to Appendices C and D for a comparison of all the options considered.

2.5 Durability/Design Life

Refer to Appendices C and D for a comparison of all the options considered.

2.6 Health and Safety, and Potential Risks and Constraints to the Project

Refer to Appendices C and D for a comparison of all the options considered.

2.7 Proposed Analysis Method

- Options 1 and 2:

The design shall be carried out in accordance with BS EN 1997-1:2004+A1:2013 and the relevant national annex. The retaining wall analysis shall be carried out using limit equilibrium software to verify overall stability and the structural load effects induced in the section, which will then be used to verify the structural design in accordance with BS EN 1992-1-1:2004+A1:2014 (Eurocode 2) or BS EN 1993-5:2007 (Eurocode 3).

The design of passive ties, or deadman anchors, which are likely to be used for the sheet pile wall option, shall be undertaken in accordance with BS 8002:2015. The design of active ground anchors, which are likely to be used for the bored pile wall option, shall be undertaken following the principles of BS 8081 (2018).

- Option 3

The design shall be carried out in accordance with BS EN 1997-1:2004+A1:2013 and the relevant national annex. The analysis shall be carried out using limit equilibrium software to verify overall stability and the structural load effects induced in the section, which will then be used to verify the structural design in accordance with BS EN 1992-1-1:2004+A1:2014 (Eurocode 2).

- Option 4

The design shall be carried out in accordance with BS EN 1997-1:2004+A1:2013 and the relevant national annex.

- Option 5

The design shall be carried out in accordance with BS 8006-1:2010+A1:2016.

2.8 Departures from Standards

None.

2.9 Construction

Refer to Appendices C and D for a comparison of all the options considered.

2.10 Operation and Maintenance

Refer to Appendices C and D for a comparison of all the options considered.

2.11 Preferred Option

On the basis of settlement-performance, cost effectiveness and ease of construction, the sheet pile retaining wall has been selected as the preferred option.

2.12 Proposed Category of Check

The proposed Category of Check is Category 2 because the effective retained height is 6.3m, the wall requires anchorage and the horizontal distance between the front of the retaining wall and the M1 carriageway is approximately 21m.

2.13 Role of the Works Examiner Supervising the Works

Not applicable.

3 REFERENCES

BS 8002:2015 – Code of practice for earth retaining structures, British Standards Institution, London.

BS 8006-1:2010+A1:2016 – Code of practice for strengthened/reinforced soils and other fills, British Standards Institution, London.

BS EN 1997-1 (2004) + A1 (2013) – Eurocode 7: Geotechnical design – Part 1, General Rules.

National Annex to BS EN 1997-1 (2004) + A1 (2013).

BS EN 1992-1-1:2004+A1:2014 – Eurocode 2: Design of concrete structures. General rules and rules for buildings.

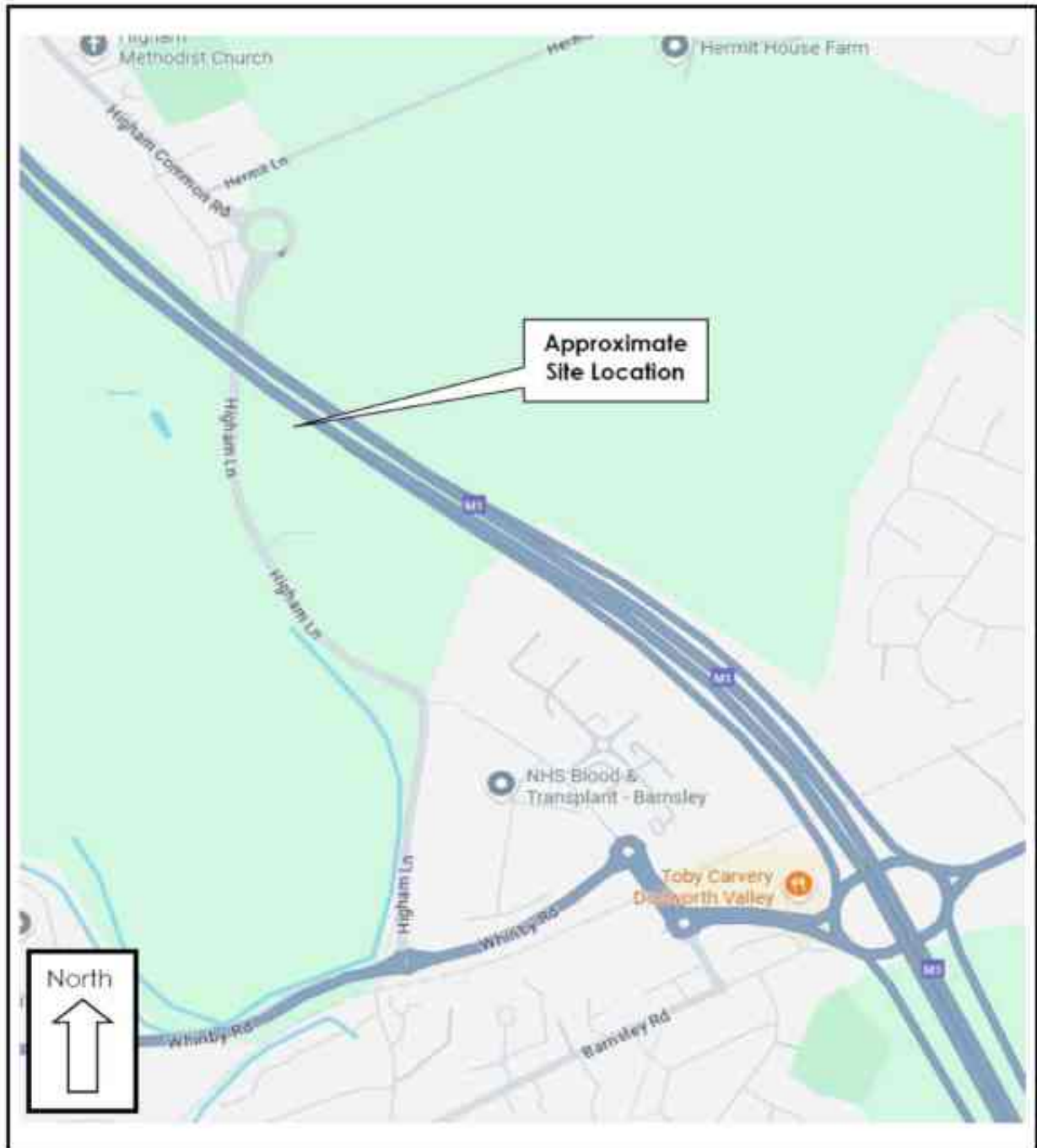
National Annex to BS EN 1992-1-1:2004+A1:2014.

BS EN 1993-5:2007 Eurocode 3. Design of steel structures. Piling.

NA to BS EN 1993-5:2007.

Appendix A

Location Plan, Aerial Photograph, Site Layout Plans

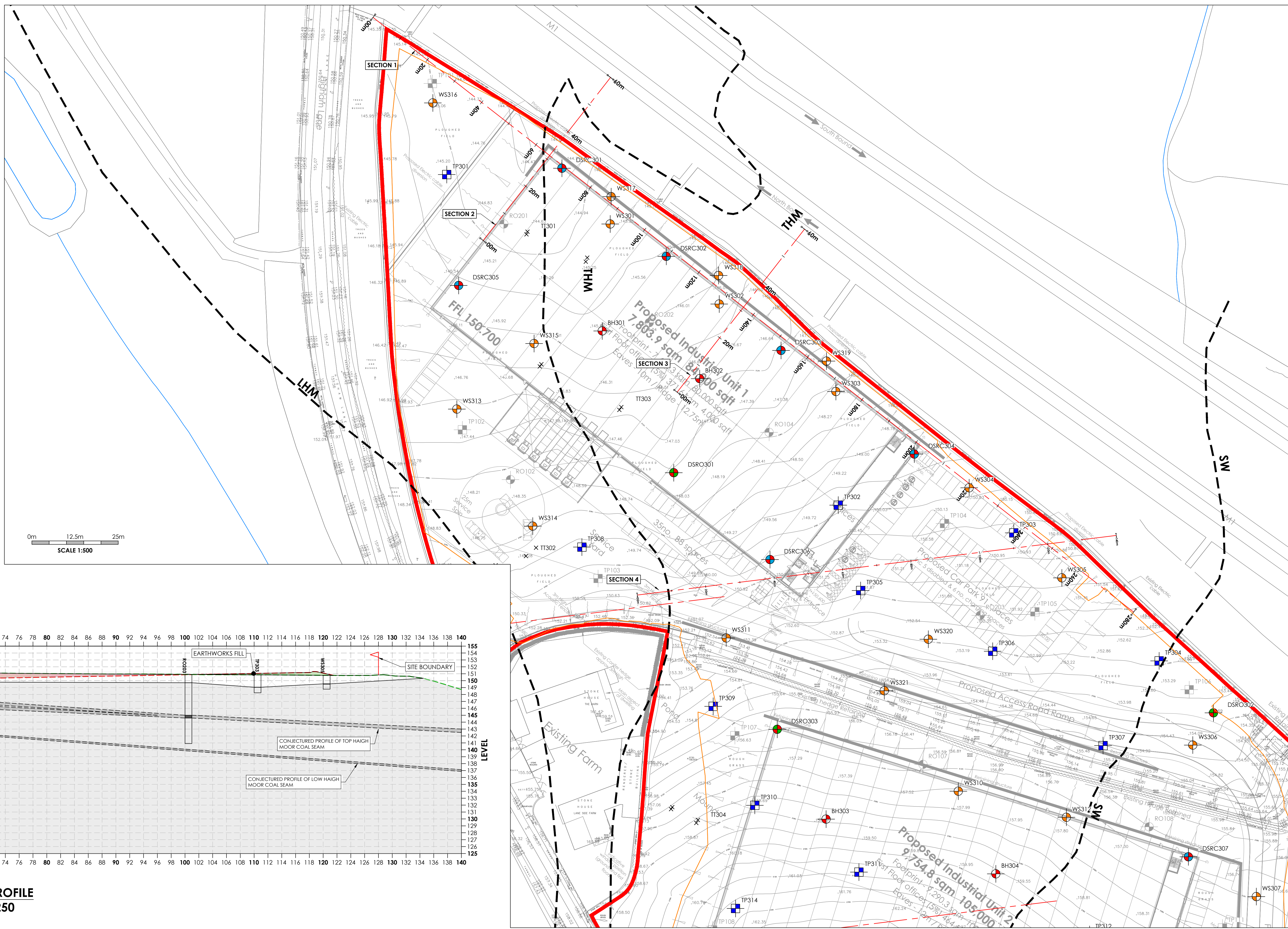
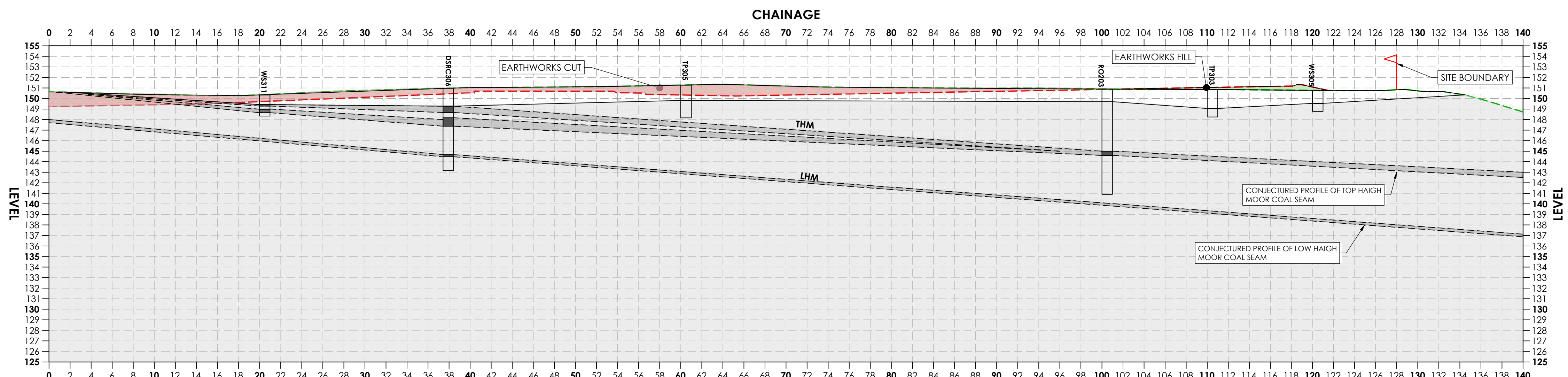
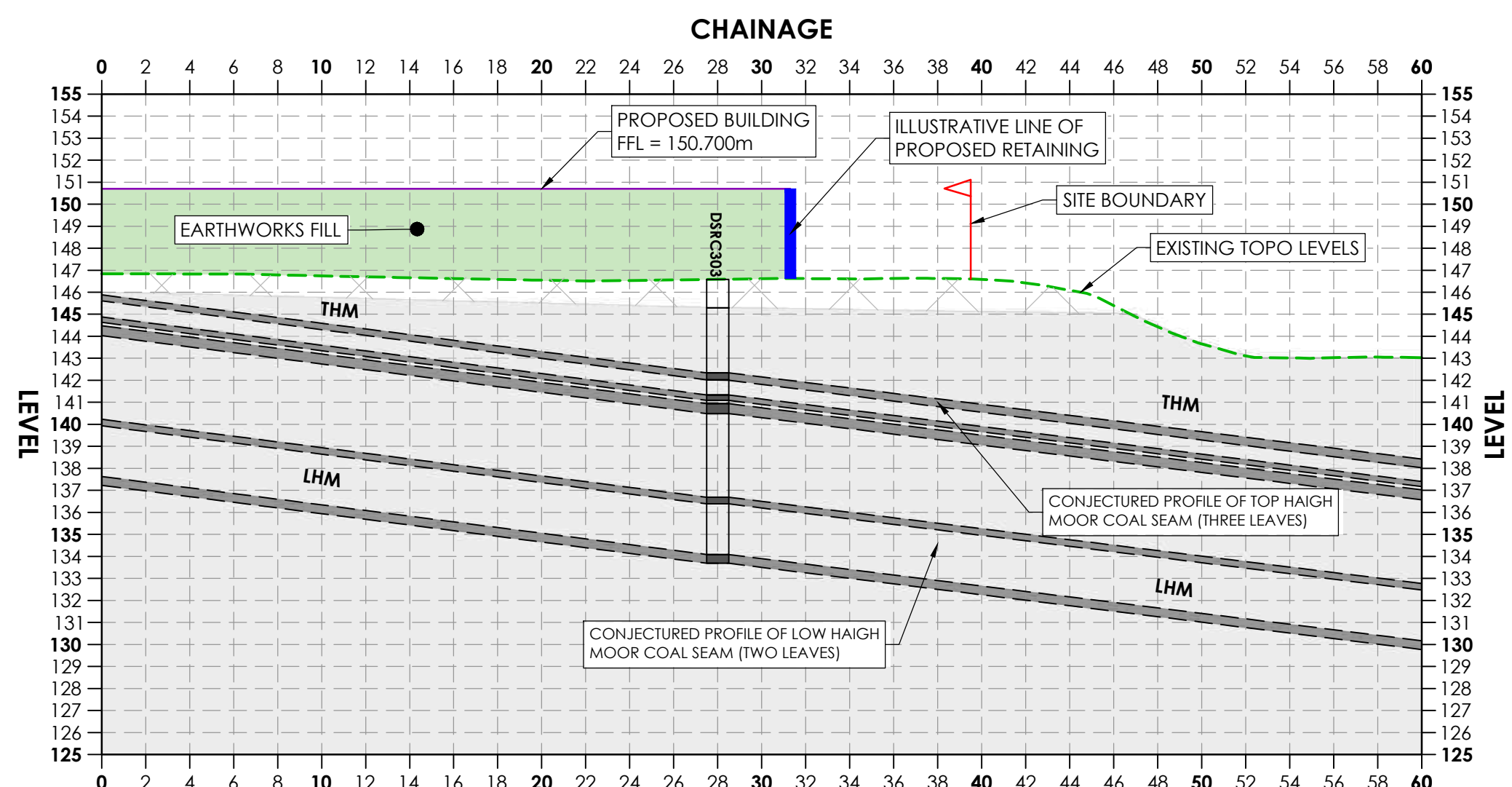
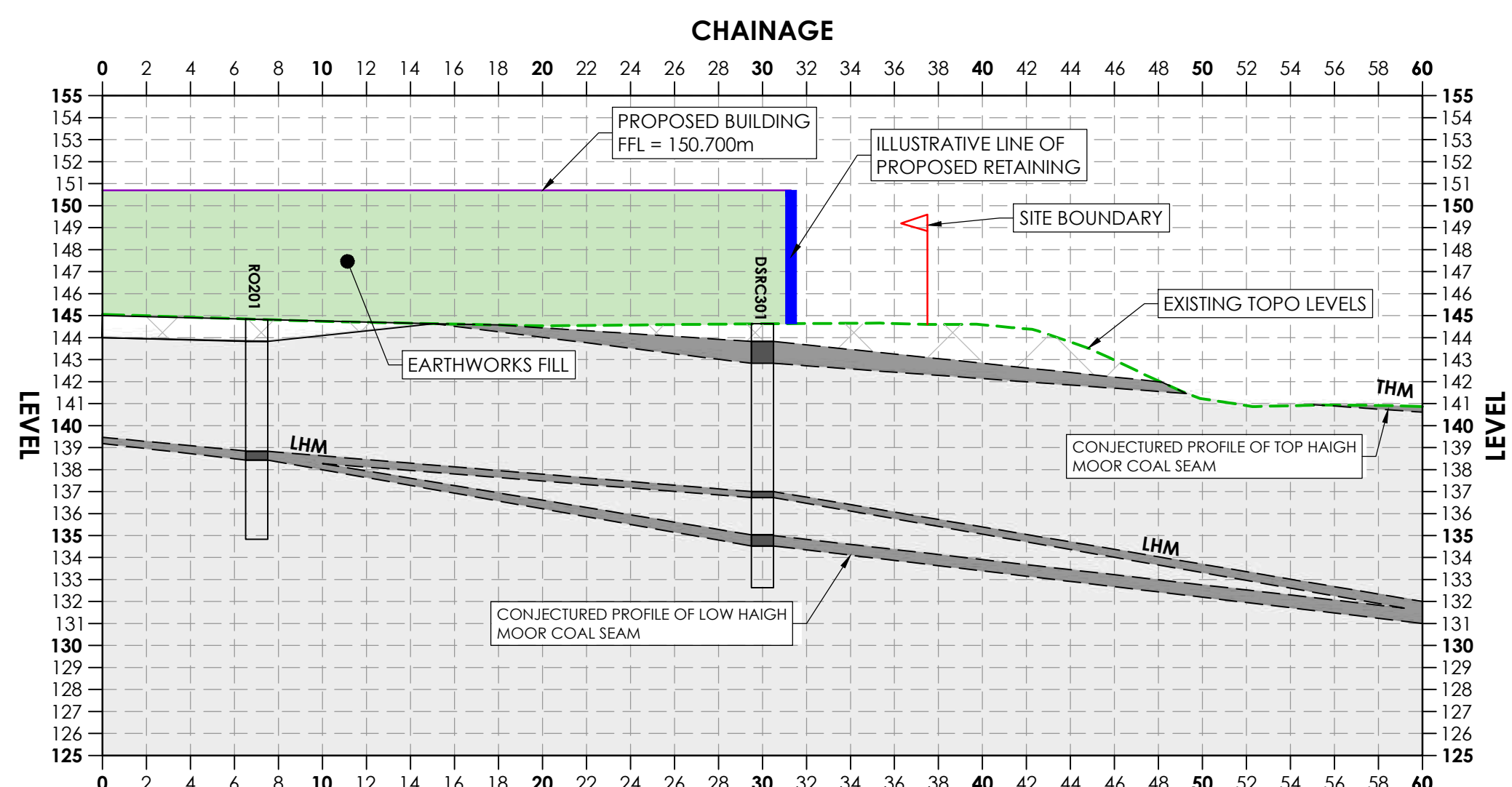
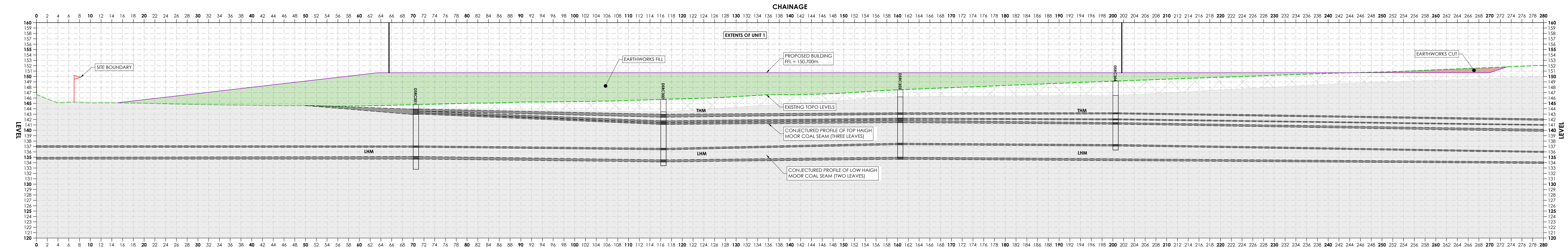


Site Location Plan



Aerial Photograph





- GENERAL NOTES**
1. ALL MATERIALS AND WORKMANSHIP IS TO COMPLY WITH JPG CONSULTANTS STANDARD SPECIFICATION & ALL RELEVANT BRITISH & EUROPEAN STANDARDS.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, M & E CONSULTANTS AND JPG CONSULTANTS DRAWINGS.
 3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO COMMENCEMENT OF WORKS.

- JPG INVESTIGATION 2025**
- BH CABLE PERCUSSIVE BOREHOLE
 - WS WINDOW SAMPLE BOREHOLE
 - DSRO DYNAMIC SAMPLE BOREHOLE WITH ROTARY OPEN HOLE FOLLOW-ON
 - DSRC DYNAMIC SAMPLE BOREHOLE WITH ROTARY CORED BOREHOLE
 - TP TRIAL PIT

- HYDROCK INVESTIGATION 2022**
- TP TRIAL PIT
 - RO ROTARY OPEN HOLE BOREHOLE

- LEGEND**
- BEDROCK (PENNINE MIDDLE COAL MEASURES)
 - CONJECTURED COAL SEAM
 - OVERBURDEN (COHESIVE SOILS AND MADE GROUND)
 - RED LINE DENOTES SITE BOUNDARY
 - PURPLE LINE DENOTES PROPOSED FINISHED LEVELS
 - DASHED GREEN LINE DENOTES EXISTING TOPO LEVELS
 - DASHED BLACK LINE DENOTES COAL SEAM OUTCROP

P03	SECTION 4 EXTENDED	18.10.25	JBW	EJS
P02	UPDATED WITH BOREHOLE DATA	24.09.25	JBW	EJS
P01	FIRST ISSUE	25.07.25	EJS	LSG
REV	DESCRIPTION	DATE	CHK	BY

Project
HICHAM LANE
BARNSELEY

Drawing Title
UNIT 1
GEOLOGICAL SITE SECTIONS

INFORMATION

JPG

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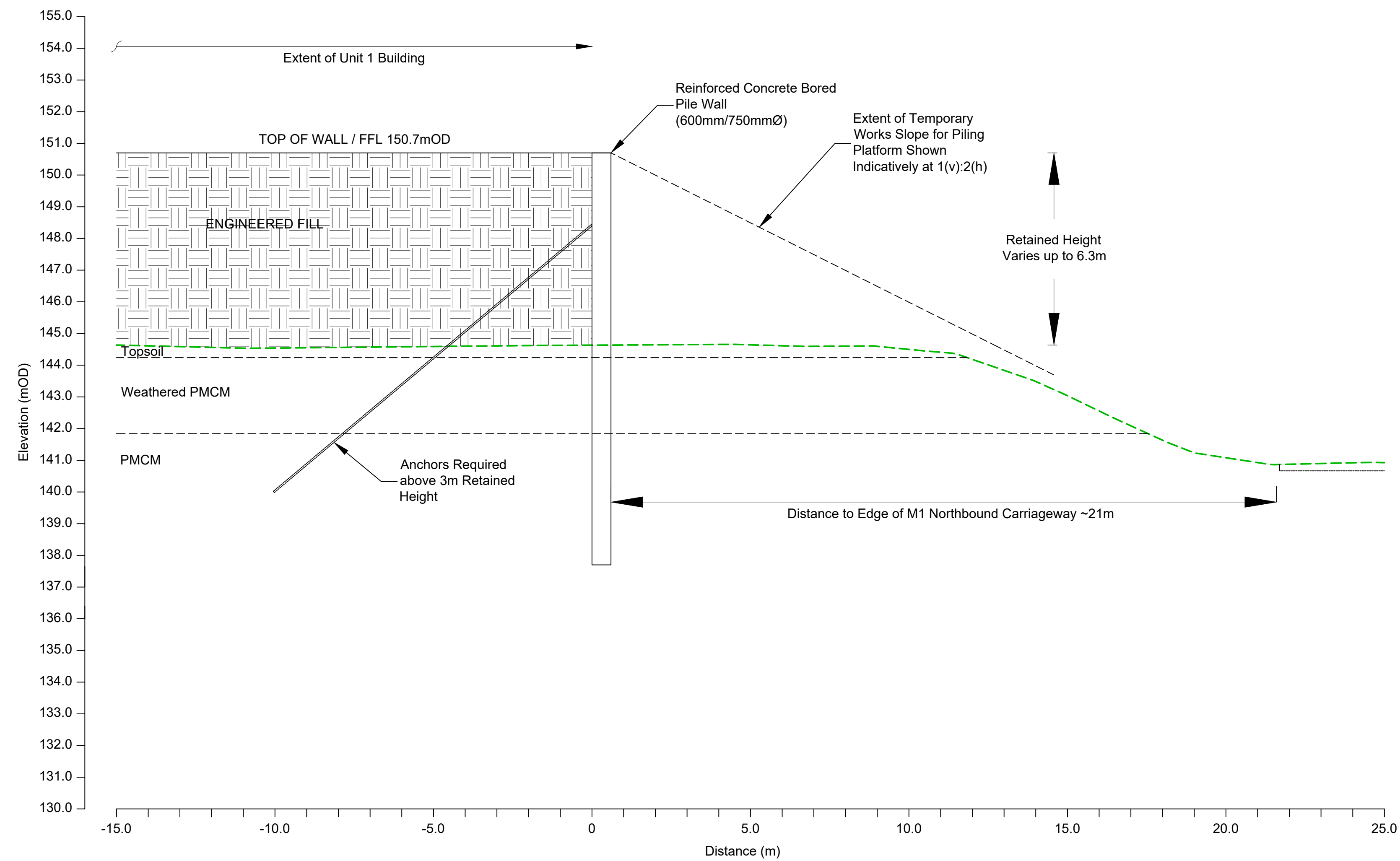
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S2

P03

Appendix B

Options Drawings



Cross Section
Scale 1:100

NOTES :

General

All dimensions mm UNO

All elevations mOD UNO

REV.	AMENDMENTS	DRAWN	CHECK	DATE



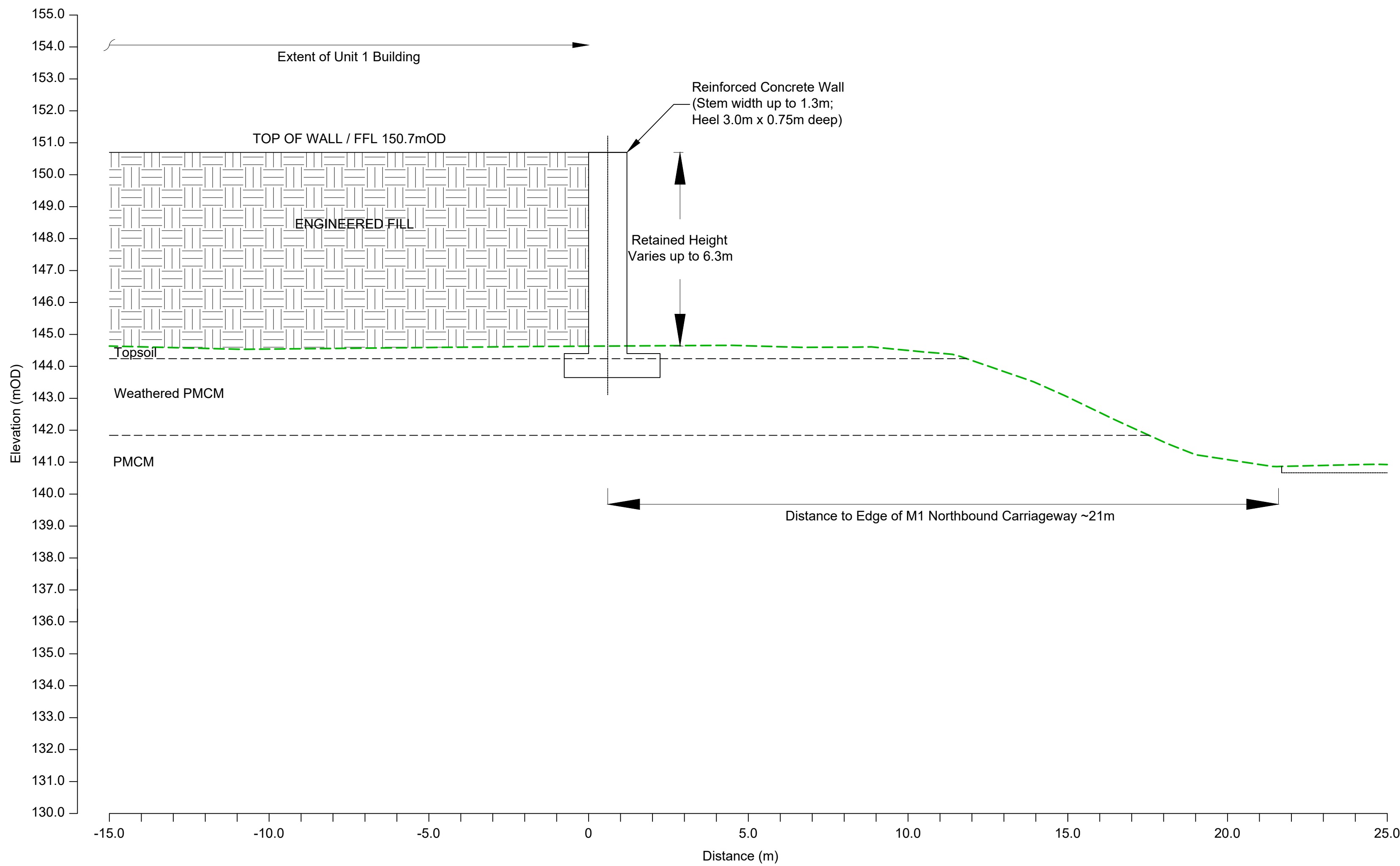
Client: **JPG Limited**

Project: **Higham Lane Retaining Wall**

Title: **Option 2
RC Bored Pile Wall**

Drawing Status: **FOR INFORMATION**

DRAWN	SM	19/12/2025	ORIGINAL SHEET SIZE	A1
CHECKED	WF	19/12/2025	SCALE	As Shown
APPROVED	WF	19/12/2025	DECEMBER 2025	
DRAWING NUMBER				REVISION
2971-DWG-003				P01



Cross Section
Scale 1:100

NOTES :

General

All dimensions mm UNO
All elevations mOD UNO

REV.	AMENDMENTS	DRAWN	CHECK	DATE



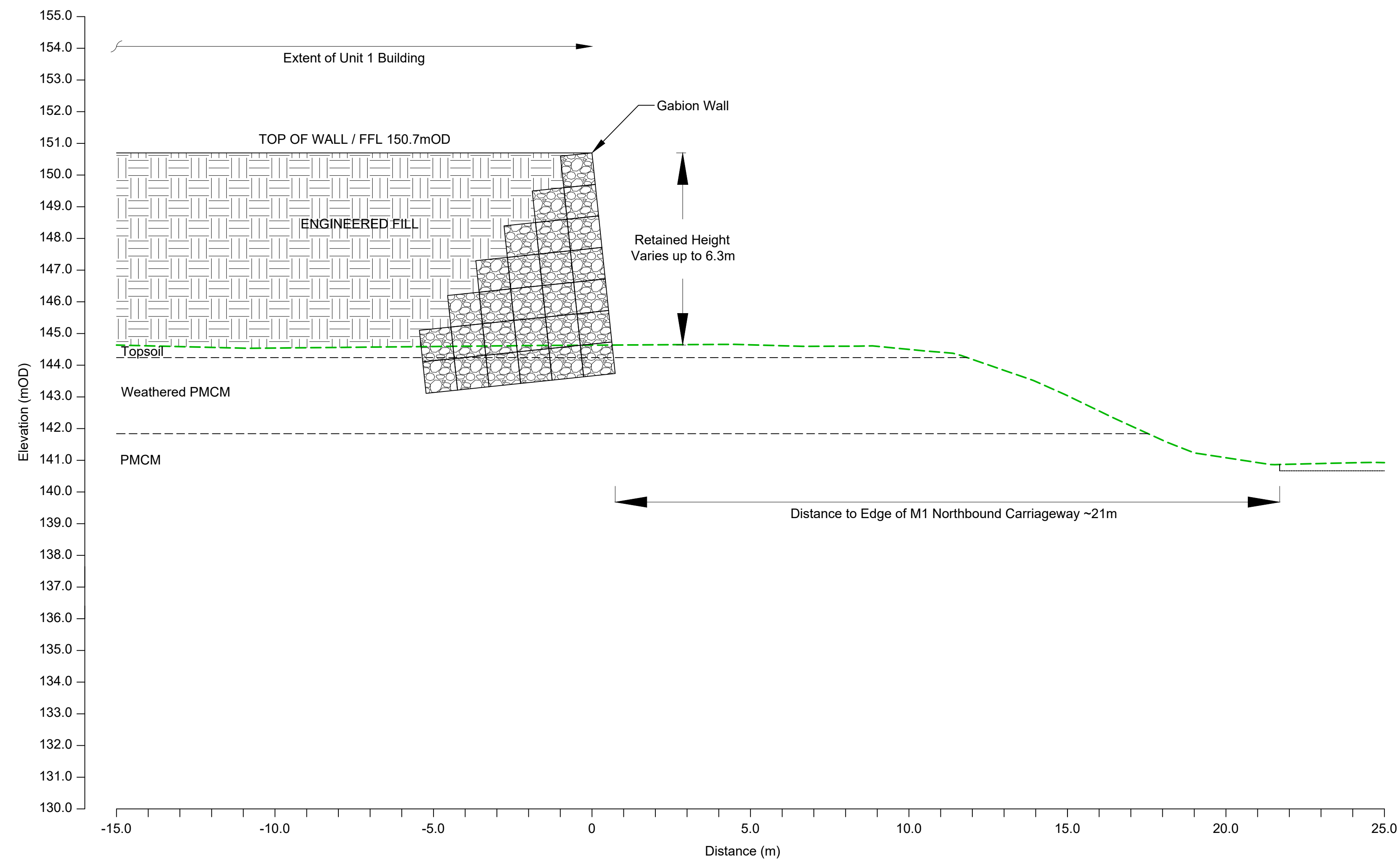
Client: **JPG Limited**

Project: **Higham Lane Retaining Wall**

Title: **Option 3
RC Gravity Wall**

Drawing Status : **FOR INFORMATION**

DRAWN	SM	19/12/2025	ORIGINAL SHEET SIZE	A1
CHECKED	WF	19/12/2025	SCALE	As Shown
APPROVED	WF	19/12/2025	DECEMBER 2025	
DRAWING NUMBER				REVISION
2971-DWG-004				P01



Cross Section
Scale 1:100

NOTES :

General

All dimensions mm UNO

All elevations mOD UNO

REV.	AMENDMENTS	DRAWN	CHECK	DATE



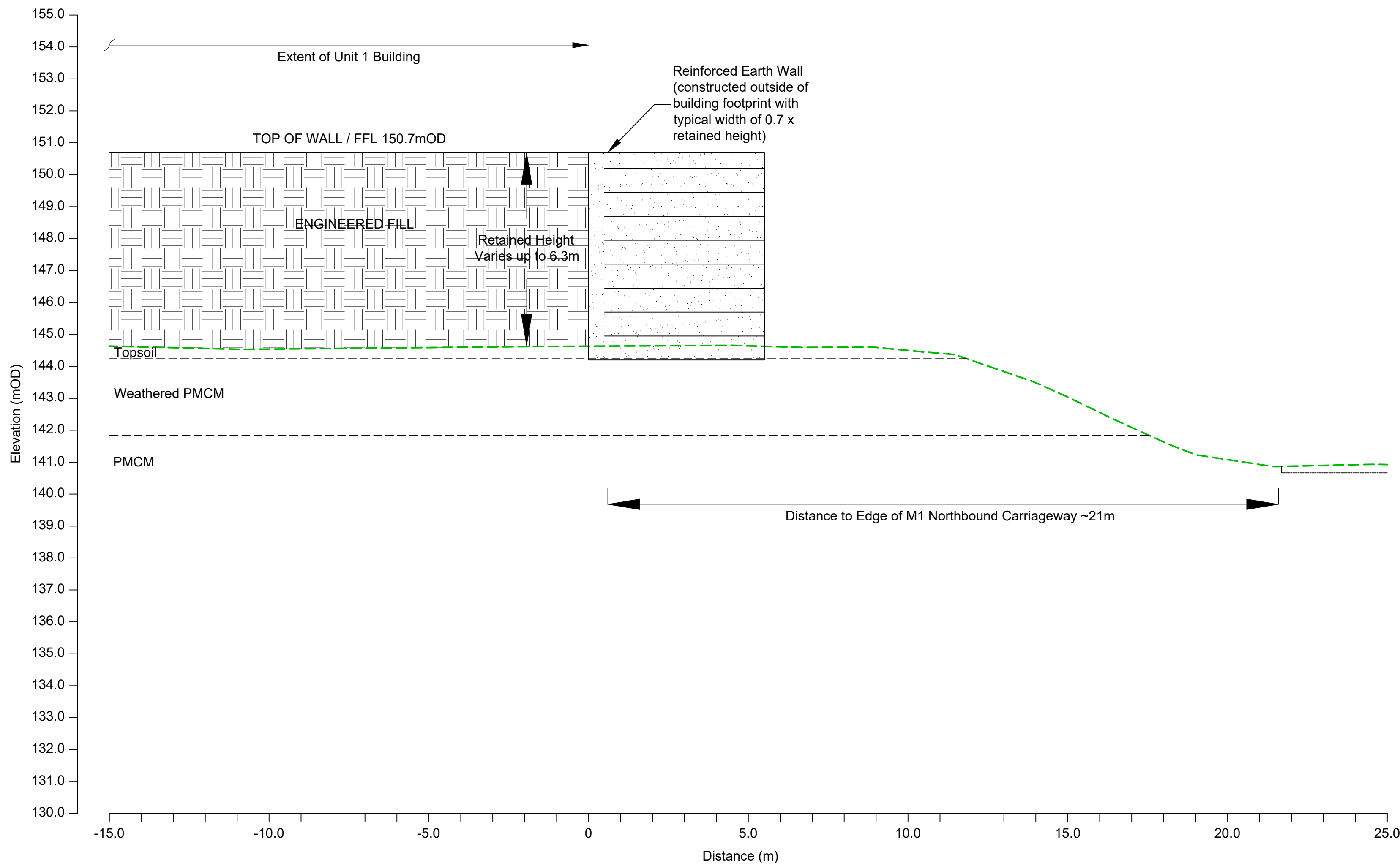
Client:
JPG Limited

Project:
Higham Lane Retaining Wall

Title:
Option 4
Gabion Wall

Drawing Status :
FOR INFORMATION

DRAWN	SM	19/12/2025	ORIGINAL SHEET SIZE	A1
CHECKED	WF	19/12/2025	SCALE	As Shown
APPROVED	WF	19/12/2025	DECEMBER 2025	
DRAWING NUMBER				REVISION
2971-DWG-005				P01



Cross Section
Scale 1:100

NOTES :

General

All dimensions mm UNO

All elevations mOD UNO

REV.	AMENDMENTS	DRAWN	CHECK	DATE



Client:
JPG Limited

Project:
Higham Lane Retaining Wall

Title:
Option 5 Reinforced Earth Wall

Drawing Status:
FOR INFORMATION

DRAWN	SM	19/12/2025	ORIGINAL SHEET SIZE	A1
CHECKED	WF	19/12/2025	SCALE	As Shown
APPROVED	WF	19/12/2025	DECEMBER 2025	
DRAWING NUMBER				REVISION
2971-DWG-006				P01

Appendix C

Advantages and Disadvantages of Each Option

2971 - Higham Lane Retaining Wall

Appendix C - Advantages and Disadvantages of Each Option

Option	Advantages	Disadvantages
Sheet Pile Retaining Wall	Cost: Moderate capital cost. Appearance: Uniform appearance. Sustainability: Options available to adopt low-carbon manufacturers and suppliers. Durability: Can be designed for a long design life of up to 120 years. Health and safety: Sheet piling is a routine construction operation. Construction: Routine construction operation. Sheet piles can be constructed from existing ground level with an upstand and backfilled. Construction programme will be short to moderate. Operation and Maintenance: Minimal operational input required.	Cost: Whole life cost will need to include monitoring and inspection, particularly for tie back system. Appearance: Sheet piles will be visible from the M1 Motorway so may require painting. Sustainability: Relatively high capital carbon consumption. Durability: Monitoring and inspection will be required for the tie-back system. Health and safety: Specialists may be required for the tie-back system. Construction: Pre-boring may be required to avoid early refusal. Operation and Maintenance: Monitoring and inspection will be requiredfor the tie-back system.
Reinforced Concrete Bored Pile Retaining Wall	Cost: None. Appearance: Uniform appearance. Sustainability: Some options available to adopt low-carbon concrete. Durability: Can be designed for a long design life of up to 120 years. Health and safety: Routine construction operation. Construction: Routine construction operation. Operation and Maintenance: Minimal operational input required.	Cost: High capital cost. Whole life cost will need to include monitoring and inspection, particularly for the anchors. A facing wall is likely to be required to retain soil between piles. Appearance: Concrete will be visibile from the M1 Motorway. Sustainability: High capital carbon consumption. Durability: Monitoring and inspection will be required for the anchors. Health and safety: Specialists may be required for the anchors. Construction: Piling platform will be required and this is unlikely to be accomodated within the flat space available using conventional temporary works slope angles. Construction programme would be relatively long. Operation and Maintenance: Monitoring and inspection will be required for the anchors.
Reinforced Concrete Stem Wall	Cost: None. Appearance: Uniform appearance. Sustainability: Some options available to adopt low-carbon concrete. Durability: Can be designed for a long design life of up to 120 years. Health and safety: Routine construction operations. Construction: Routine construction operations. The majority of the works can be undertaken from the footprint of the proposed Unit 1 building. Operation and Maintenance: Minimal operational input required.	Cost: Very high capital cost. Appearance: Concrete will be visibile from the M1 Motorway. Sustainability: Very high capital carbon consumption. Durability: None. Health and safety: None. Construction: Significant height for this type of construction. Construction programme would be very long. Operation and Maintenance: None.
Gabions/ Gravity Wall	Cost: Relatively low capital and whole life cost at low retained heights. Appearance: Uniform appearance and can blend into the landscape. Sustainability: Good sustainability with options to use recycled stone infill. Durability: Can be designed for a moderately long design life using convetional practices. Health and safety: Routine construction operations. Construction: Routine construction operations. The majority of the works can be undertaken from the footprint of the proposed Unit 1 building, moving out as needed. Operation and Maintenance: Minimal operational input required.	Cost: Capital cost may rise significantly for retained heights greater than 3m. Appearance: None. Sustainability: None. Durability: May require galvanisation, or similar measures, to achieve a 120-year design life. Health and safety: Retained heights greater than 3m would be non-routine for some installers. Construction: The construction programme would be long given there are retained heights greater than 3m. Operation and Maintenance: High potential settlement if not founded on bedrock, which may limit the suitability of this option, particularly for retained heights greater than 3m.
Reinforced Earth Wall	Cost: Moderate capital and whole life cost. Appearance: Uniform appearance. Sustainability: Options available to use low-carbon proprietary products. Durability: Can be designed for a moderately long design life using conventional practices. Health and safety: Routine construction operation for the specialist supplier/installer. Construction: Routine construction operation for the specialist supplier/installer. The majority of the works can be undertaken from the boundary of the proposed Unit 1 building, moving out as needed. Operation and Maintenance: Minimal operational input required.	Cost: None. Appearance: Facing panels are typically made from concrete and would be visible from the M1 Motorway. Sustainability: A significant volume of Class 6I/6J fill material would likely need to be imported onto site. Durability: May require specific measures to achieve a 120-year design life. Health and safety: None. Construction: The construction programme would be moderately long. Operation and Maintenance: Wall would be need to be constructed outside of the proposed Unit 1 building footprint to leave space for reinforcement. High potential settlement may limit the suitability of this option.

Appendix D

Options Scoring

2971 - Higham Lane Retaining Wall

Appendix D - Options Scoring

Constraint	Sheet Pile Retaining Wall	Reinforced Concrete Bored Pile Retaining Wall	Reinforced Concrete Stem Wall	Gabions/ Gravity Wall	Reinforced Earth Wall
Capital Cost	3	2	1	4	3
Whole-life Cost	2	2	2	4	2
Appearance	3	2	2	4	3
Sustainability	3	2	1	4	3
Durability	4	4	4	2	3
Health and Safety	3	3	4	3	3
Construction	4	2	1	2	3
Operation and Maintenance	4	4	5	1	1
Total	26	21	20	24	21

Scoring Criteria

Qualitative scoring:	
Very Low	1
Low	2
Moderate	3
High	4
Very High	5