south east manchester multi modal strategy
semmms

SEMMMS A6 to Manchester Airport Relief Road

URS: Network Rail Hazel Grove and Buxton Line – Justification of Rail Over Road Bridge

1007/7.05/106

June 2012

STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

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Disclaimer

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REFERENCES

URS Hazel Grove to Buxton Rail Crossing Feasibility Report Dec 2012

EXECUTIVE SUMMARY

The feasibility study for the crossing commenced with a desk study gathering all the relevant available information which might affect the possible options. Previous available reports on the scheme were studied. Continual consultation with the South East Manchester Multi Modal Study (SEMMMS) Project Team and Network Rail has enabled a better understanding of the constraints affecting the development of viable and suitable option for the crossing. The SEMMMS design is being led by Stockport Metropolitan Borough Council.

Two primary options have been identified for the proposed relief road, one running the road along a raised embankment over the existing A6 and the railway line (Hazel Grove to Buxton Line) and an alternative of a similar route locating the new road within a cutting beneath the existing A6 and the main railway line. The existing A6 will remain a local route through for buses whilst the realigned A6 will be used for main commuter traffic.

Land take

‘Over Railway Option’

The land taken as a result of going over the railway line is significant. The width of the footprint of the embankment could vary between approximately 26.0m at the start of the scheme and 90.0m immediately to the South of the crossing. The footprint of the proposed embankment to accommodate the highway alignment crossing over the railway is approximately 48,750m^2 from chainage 8250m to 8950m. The residential properties and the industrial building in close proximity crossing will require demolition in order to construct the embankment.

‘Under Railway Option’

The footprint of the cutting proposed by SMBC to accommodate the highway alignment under the railway is approximately 22,700m^2 from chainage 8250m to 8950m. The properties in close proximity to the crossing are proposed to be purchased through the CPO process and disposed on completion of the scheme as demolition is not required.

Highway

‘Over Railway Option’

The highway alignment of the relief road going over the railway line is mainly dictated by the headroom required over the tracks and also satisfying the Design Manual for Roads and Bridges (DMRB) requirements in terms of sag and hog curvature. A road gradient of 5.0% would be necessary between the proposed new junction with the realigned A6 to the north and the railway crossing in order to achieve the required clearance. This is greater than the desired maximum gradient of 4.0% for dual carriageways (TD9/93 cl4.1). The effect of this alignment will be detrimental to traffic flow and speeds, particularly in the case of HGVs.

A road gradient of 5.0% will also be required to the south of the crossing location. The existing ground level falls away from the crossing location so a steep gradient is required to meet this within a reasonable distance. It should be noted that the height of the embankment extends up to 12.0m above existing ground level immediately to the south of the crossing.

'Under Railway Option'

The highway alignment required for crossing beneath the railway requires the road to be constructed within a cutting. This alignment follows the site topography more closely.

A constant road gradient of approximately 2.15% is required from the proposed new A6 Junction to achieve the necessary clearances below the railway. This is less than the desired maximum gradient for dual carriageways and therefore is in accordance with the Design Manual for Roads and Bridges (DMRB). This gradient continues beyond the crossing location towards the south.

Environment, Planning and Visual Impact

'Over Railway Option'

The embankment associated with SEMMMS Relief Road going over railway line will require the import and compaction of approximately 350,000m^3 of extra fill material to the scheme. The associated pollution from extra plant and delivery vehicles to construct the embankment should be considered. The noise created by plant and delivery vehicles will have an impact on local residents during the construction period.

Once the road is in use, an elevated road will broadcast traffic noise across the local area unless measures are taken to mitigate the effects. Mitigation measures will further increase the adverse visual impact.

The construction of the embankment will have a significant impact on the local watercourse. It will be necessary to construct a culvert beneath the embankment or the watercourse will need to be diverted to avoid erosion of the embankment.

The embankment will have a significant adverse visual impact on its surroundings. It is estimated that the road level will be up to 12m above current existing ground level. Due to its close proximity to a residential area, the embankment will block the view of the open landscape that a number of houses currently face. With the road elevated to level, traffic will be clearly visible to nearby residents.

Planning permission for the overbridge option is likely to be more problematic compared with the underbridge option due to the adverse environmental impacts.

'Under Railway Option'

With the SEMMMS Relief Road situated in a cutting at this location, the volumes of cutting and filling material are in balance across the scheme. Any excavated fill will be used locally to construct embankments.

Construction of the cutting will require extensive use of excavators. In the event that rock head is encountered rock breaking equipment will be required, thus increasing noise pollution during construction.

The post completion noise pollution levels would significantly be controlled as the scheme would be within a cutting.

If the SEMMMS Relief road highway alignment is positioned in a cutting the road and associated traffic will be hidden from view. The view of the flat open farmland and the woodland beyond will be less impacted. Sight lines on the railway will remain unaffected.

Health and safety

'Over Railway Option'

The relaxation from standard for the vertical highway alignment of the crest curvature significantly restricts the stopping sight distance for road users. And in combination with the downhill approach to the proposed new A6 junction it is potentially less safe than going under the railway.

This option involves more work close to the live railway with the increased risk of an accident impacting on the railway. There would be considerable works required over the live railway once the basic deck of the structure was in place in order to complete the construction of the bridge.

'Under Railway Option'

The whole of the structure could be built off line which would minimise the work adjacent to the live railway and virtually all of the works on/around the railway would be carried out during blockade. In addition this alignment removes the downhill approach to the re-aligned A6 junction.

Liabilities and Ownership

'Over Railway Option'

The construction maintenance cost will be incurred by the outside party. The bridge will be owned by the outside party.

'Under Railway Option'

The construction and maintenance cost will also be incurred by the outside party. The bridge will be owned by NR. The work will be witnessed by NR.

Taking the above factors in to account the option locating the new road within a cutting is clearly the most favoured option.

The principal constraints affecting the solutions, should the new road be located within a cutting are the availability of track possession times. The maximum known available possession times are 54 hours and this is available during the Christmas week.

A number of options have been considered in detail against the criteria of how long it takes to construct the option, the cost in general terms, the risks and any other relevant factors including whether that method of construction has been undertaken in practice. It should be noted that some of the solutions would require more than 54 hours.

However the current favoured bridge option is the reinforced concrete cantilever abutments slid into place together with a standard Network Steel Half Through underbridge E- type deck. This requires a 105 hr possession which would require NR approval to proceed.

1. INTRODUCTION

1.1 South East Manchester Multi Modal Study (SEMMMS)

The proposed SEMMMS A6 to Manchester Airport Relief Road will provide a new approximately 10km long dual carriageway, with new sections of road built from the A6 at Hazel Grove to the eastern end of the existing A555 at Woodford Road, Bramhall and from the western end of the existing A555 at Wilmslow Road, Handforth to Manchester Airport and the spur road to the M56 (refer to location plan in Appendix A).

The scheme is anticipated to require approximately 13 bridge structures (highways bridges, accommodation bridges and footbridges) and up to 17 retaining walls. Four of bridge structures will cross the railway.

The scheme is located within three local authority boundaries Stockport, Manchester, and East Cheshire with the majority of the scheme being in Stockport.

A pedestrian and cycle route is proposed for the whole length including retrofitting it to the 4km existing section of the A555.

The bridge crossing is approximately 40.0m southeast from the existing A6.

1.2 Report Objectives

This report has been prepared to discuss the A6 to Manchester Airport Relief Road highway alignment primary options available for crossing Buxton and Edgeley Junction Branch railway line.

The implications of the construction of an over bridge crossing or an under bridge crossing will be discussed. The identification of suitable structural forms for the crossing will not be discussed in detail within this report although the design options are currently being developed with the SEMMMS Project Team and NR. Refer to the ‘URS Hazel Grove to Buxton Rail Crossing Feasibility Report’ Dec 2012.

1.3 Terminology

For the purpose of this report the A6 to Manchester Airport Relief Road will be referred to as the ‘SEMMMS Relief Road’.

The name adopted for the proposed bridge structure at the crossing within other SEMMMS documentation is the ‘Hazel Grove to Buxton Line Bridge’. This name will be used in this report.

1.4 The Need for the Scheme

The aim of the scheme (SEMMMS Relief Road) is to reduce levels of traffic in local communities including Stockport, Wythenshawe, Heald Green, Hazel Grove, Poynton and Bramhall, which will bring benefits for everyone in these areas:

- Existing roads will be improved to help a create safer environment.

- Communities and shopping centres will be relieved of the impact of heavy goods vehicles which will transfer to the new road.
- Freight traffic will benefit, both from the reduced congestion on existing roads and the provision of new, less congested routes, helping to promote existing and new business in the area.
- Local air quality will be improved as there will be less pollution from slow moving traffic.
- Local centres and the services and facilities they provide for residents will become more accessible for everyone, including those with mobility difficulties.
- Access to local shops and work places will be made easier and safer for those without cars, whilst those who choose or need to use their car will benefit as congestion will be reduced.
- The space created on existing roads will allow for the development of public transport services as an attractive alternative to using the car.
- Walking and cycling routes are being considered as part of the new road scheme and on existing roads where traffic congestion will have been relieved.
- Car drivers who presently travel along the existing roads in and around Greater Manchester will benefit from the scheme.

In sum the reduction of traffic and congestion will make the roads in these areas safer. Improved transport links will help to promote the growth of existing and new business in the area. The scheme will help to improve air quality and reduce pollution produced by slow moving and stationary traffic.

1.5 URS Commission

URS was commissioned by SEMMMS Project Team in November 2011 to prepare an underbridge/Overbridge options report at this location at the request of NR.

2. SITE DESCRIPTION

2.1 Existing topography

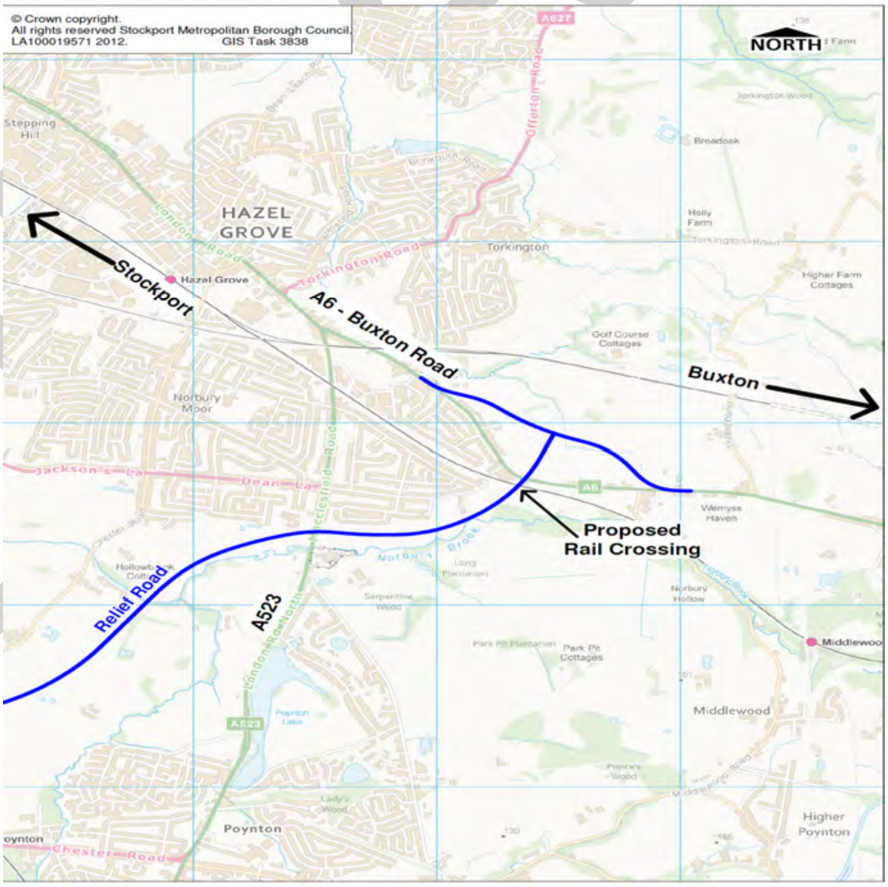
The location of the crossing is at the eastern edge of the Stockport conurbation. A full topographical survey has been undertaken to develop highway alignment options for the crossing and is summarised in the following paragraphs.

The site is relatively flat with the railway situated on a low embankment. To the north of the crossing the ground level rises at a gradient of approximately 1%. To the south of the crossing the ground level falls at a gradient of approximately 7% towards Norbury Brook.

To the west of the crossing location there is a residential area within 150m. There are four residential properties and a large industrial property within close proximity to the crossing. There is a masonry arch underbridge crossing a minor residential road at an approximate mileage of 3 miles 25 chains.

To the east of the crossing is open farmland and countryside. There is a farm access level crossing at a mileage of 3 miles 40 chains and a footpath level crossing at a mileage of 3 miles 46 chains. (See section 2.4).

Approximately 200m to the south of the crossing there is a watercourse within established riparian woodland, beyond which there is further farmland.



Plan showing the location of the crossing

2.2 Hazel Grove to Buxton Railway Line

The proposed SEMMMS Relief Road highway alignment crosses the Buxton and Edgeley Junction Branch railway line (BEJ) at an approximate mileage of 3 miles 32 chains. The National Grid Reference for the crossing is E393334, N385654.

Buxton and Edgeley Junction Branch is a non-electrified twin track railway supported on concrete sleepers and ballasted track on approximately 1.0m high embankment at the crossing.

The line provides a commuter route between Buxton and Manchester. Network Rail has advised that there is no intention currently to electrify the line and that this assumption can be considered for development of the SEMMMS Relief Road highway alignment.

At the proposed crossing location the railway alignment is on a vertical curve with a general fall of approximately 2.14% to the west. Horizontally, the alignment is at the start of a curve with an approximate radius of 3000m.

General view (looking towards Buxton) of the Hazel Grove to Buxton Line

2.3 SEMMMS Relief Road

The SEMMMS Relief Road comprises of dual 7.3m carriageways and a pedestrian/cycle route. At this location, the total width of the road, to the outside edge of the verges is 26.0m. The road would cross the railway at a skew angle of 18°.

2.4 Ground Condition

The ground and groundwater conditions for the Hazel Grove/Buxton Railway Bridge have been assessed using relevant geological maps and 15 no. Exploratory hole logs provided by a number of phases of GI for the area.

The preliminary geotechnical assessment anticipated that a box or pad foundation founded on very weak to weak Coal Measures strata will provide a suitable foundation method for an underbridge/Overbridge option (refer to the ‘URS Hazel Grove to Buxton Rail Crossing Feasibility Report’ Dec 2012). Alternatively piled foundations could be adopted due to constraints of working next to live railway.

It is also worth noting that the geotechnical assessment revealed that it is unlikely that Coal Mining has been carried out in the area underlying the crossing.

2.5 Land Ownership

The compulsory purchase Order (CPO) will be carried out for the entire scheme. However, NR would ordinarily object to CPO as a matter of course. The timeline provides sufficient time for technical input on land disposal implications. NR would therefore look for disposal of land to be processed by agreement and would usually seek to agree a Legal agreement in order to allow Network Rail to withdraw its objection to the CPO.

2.6 Site Access

Access to the North side of the railway line at the crossing is currently difficult. Clearances and some buildings need to be removed so that proper access could be gained to the North side of the railway line. Access to the South side of the railway line is not problematic. It is anticipated that some part of the scheme on the South side of the railway line is required to be in place to facilitate access to the vicinity of the site/crossing.

2.7 Topographical Survey

Full topographical survey is undertaken including the Network Rail assets at the crossing by the client (SMBC) and has been used to develop the options.

3. CONSULTATION

3.1 Stockport Metropolitan Borough Council (SMBC)

3.1.1 Planning

Planning permission for the full SEMMMS scheme has not been granted yet. One of the aims of this study is to determine the vertical alignment of the relief road at this location in order to apply for planning approval. It is anticipated that a single application will be submitted by winter 2012 to SMBC, who will act as Local Planning Authority for the entire scheme.

3.1.2 New Services

All the necessary required agreements should be in place with NR for the necessary services to cross the NR assets.

4.1.4 Environmental

Environmental impact associated with both (the Overbridge and the Underbridge) options has been carried out at this crossing location. SMBC has advised that all environmental issues will be dealt with by Environmental Consultant, Mouchel.

3.2 Network Rail

Network Rail has appointed a Project Manager and an Asset Protection Engineer for the scheme and the SEMMMS Project Team is currently liaising with them. The SEMMMS Project Team will continue to liaise with the NR Development Surveyor to mitigate the impacts on NR land, permanently and during construction.

3.2.1 Infrastructure Records

All the necessary NR asset information will be provided by the NR asset protection team.

4. DESIGN CONSTRAINTS

4.1 Railway Possessions

Discussion is taking place/is ongoing with NR regarding the possession opportunities available. From the initial review the Normal Rules of Route possessions are as follows:

- Mid week: 6.0 hours and 20 minutes (23:10- 5:30) night time possessions are available 9 weeks per year.
- Week ends: 9.0 hour possession (23.20 Saturday to 08.15 Sunday) is available all year.

4.2 Highway Alignment at the Railway Crossing

The horizontal alignment for the scheme SEMMMS at the crossing with the railway line is the same for both Underbridge/Overbridge options. The proposed scheme (SEMMMS) crosses the railway line at 18 degree skew.

The vertical alignment gradient of the proposed scheme at the crossing should it go under or over the railway line is 2.15% and 5% respectively.

4.3 Other Constraints- Access

At the proposed crossing the existing A6 runs parallel to the railway line and is approximately 40m away (for further information refer to section 2.6).

5. OPTIONS CONSIDERED AND COMPARISONS

The following discusses potential design options for the road over rail and road under rail options. Design development is continuing between NR, URS and the SEMMMS Project Team.

5.1 Options for the Over/Under Bridge

The requirement for SEMMMS Relief Road to cross the railway at this location is critical for the viability of the scheme. There are two highway alignment alternatives available to achieve this and these will be discussed in parallel to allow direct comparison. These options are:

5.1.1 Overbridge: this will involve the construction of an embankment to raise the SEMMMS Relief Road highway alignment taking it over the railway (this will be discussed in section 5.2).

5.1.2 Underbridge: the SEMMMS Relief Road will be constructed in a cutting and taken beneath the railway (this will be discussed in section 5.2).

5.2 Proposed Options

5.2.1 Overbridge: Pre-cast Concrete Deck with Integral Abutments

Subject to confirmation by Network Rail regarding the distance from the running line for construction of the abutments without a possession or blockade, other than overnight closures under the rules of route, a single span portal frame is feasible. This would use reinforced concrete integral abutments and a deck of prestressed, pretensioned concrete beams with an insitu reinforced concrete deck slab. For the general arrangement of the overbridge option, refer to drawing 1007/3D/DF5/A6-MA/B02/702-1A in Appendix B).

The construction sequences comprises of excavating to the formation level (outside the railway boundary and the support zones) and constructing the reinforced concrete abutments on both sides of the railway line to the underside of the precast beams. This could be done without the need for possession times. The pre-cast beams will then be craned in with the permanent formwork. This could be done during the RoR possession times. This will be followed by the installation of the safety screens, casting the insitu deck slab and erecting the high containment parapets (H4a).

5.2.2 Underbridge: Insitu Concrete Portal Frame Bridge

This comprises of reinforced concrete portal frame: the deck would be a half though section to minimize the construction depth. It would weigh approximately 2600 tonnes (including ballast) so it would be too heavy to move with a transporter and would probably have to be installed by **sliding** (for the general arrangement, refer to drawing 1007/3D/DF5/A6-MA/B02/702-1B in Appendix B).

The anticipated construction sequences are as follows:

Without RoR possessions (except where minor preliminary works for access are necessary)

- Excavate cutting to form construction platform outside the railway boundary and track support zone
- Install safety screens where required
- Construct concrete launching platform (including precast runway units for use in bridge slide)
- Construct reinforced concrete abutments
- Construct deck on false work
- Assemble bridge slide infrastructure

During a blockade of the railway

- Remove track and ballast
- Excavate embankment and ground in railway support zone
- Install temporary precast concrete bridge slide runway units and slide rails
- Slide complete bridge into place by jacking
- Backfill abutments
- Reinstate track and ballast

5.3 Highway Alignment

5.3.1 Overbridge

The highway alignment of the scheme going over the railway line is mainly dictated by the headroom required over the tracks and also satisfying the Design Manual for Roads and Bridges (DMRB) requirements in terms of sag and hog curvature. A road gradient of 5.0% would be necessary between the A6 junction to the north and the railway crossing in order to achieve the required clearance. This is greater than the desired maximum gradient of 4.0% for dual carriageways (TD9/93 cl4.1). The effect of this alignment will be detrimental to traffic flow and speeds, particularly in the case of HGVs.

Two 3D models of the proposal showing the Overline alignment has been produced to assist understanding (refer to Figures 1 and 2 in Appendix C and also refer to drawing 1007/3D/DF5/A6-MA/B02/702-2A in Appendix B). It is apparent from the drawing that the alignment requires high embankments to carry the proposed scheme over the railway line.

A road gradient of 5.0% will also be required to the south of the crossing location. The existing ground level falls away from the crossing location so a steep gradient is required to meet this within a reasonable distance. It should be noted that the height of the embankment extends up to 12.0m immediately to the south of the crossing.

The crossing itself will be at the crest of a vertical curve in the highway alignment. There is not enough space for the highway alignment to achieve the minimum desirable length of crest curvature and so a relaxation from standards will be required.

5.3.2 Underbridge

The highway alignment required for crossing beneath the railway requires the road to be constructed within a cutting. This alignment follows the site topography more closely.

A constant road gradient of approximately 2.15% is required from the A6 Junction to achieve the necessary clearances below the railway. This is less than the desired maximum gradient for dual carriageways. This gradient continues beyond the crossing location towards the south.

Two 3D models of the proposal showing the underline alignment has been produced to assist understanding (refer to Figures 3 and 4 in Appendix C and also refer to drawing 1007/3D/DF5/A6-MA/B02/702-2B in Appendix B). It is apparent from the drawing that the alignment requires high embankments to carry the proposed scheme over the railway line.

5.4 Land take

5.4.1 Overbridge

The land taken as a result of going over the railway line is significant. The width of the footprint of the embankment could vary between approximately 26.0m at the start of the scheme and 90.0m immediately to the South of the crossing.

The footprint of the proposed embankment to accommodate the highway alignment crossing over the railway is approximately 48,750m^2. The residential properties and the industrial building in close proximity crossing will require demolition in order to construct the embankment.

A watercourse runs almost parallel to the scheme and as a result of this proposal the watercourse will be affected. In fact either a long retaining wall is required to keep the fill away from the watercourse or a concrete culvert is required for the watercourse at the vicinity of the scheme.

5.4.2 Underbridge

The footprint of the cutting proposed by SMBC to accommodate the highway alignment under the railway is approximately 22,700m2. The properties in close proximity to the crossing can be preserved by the construction of retaining walls.

5.5 Planning

5.5.1 Overbridge

As part of the full scheme planning application it may be potentially problematic to obtain planning approval for the overbridge option.

5.5.2 Underbridge

It is potentially less problematic to obtain planning approval for the underbridge option.

5.6 Environment

5.6.1 Overbridge

The construction of the embankment to accommodate the crossing will require the import and compaction of approximately 350,000m^3 of extra fill material to the scheme. The associated pollution from extra plant and delivery vehicles to construct the embankment should be considered.

The noise created by plant and delivery vehicles will have an impact on local residents during the construction period.

During use an elevated road will broadcast traffic noise across the local area unless measures are taken to mitigate the effects. Mitigation measures will further increase the adverse visual impact.

The construction of the embankment will have a significant impact on the local watercourse. It will be necessary to construct a culvert beneath the embankment or the watercourse will need to be diverted to avoid erosion of the embankment. Both of these solutions will require the devegetation of the established riparian zone surrounding the watercourse and the destruction of natural habitat. It is likely that consent and approval from the Environment Agency will be difficult to obtain.

5.6.2 Underbridge

With the SEMMMS Relief Road situated in a cutting at this location, the volumes of cutting and filling material are in balance across the scheme. Any excavated fill will be used locally to construct embankments.

Construction of the cutting will require extensive use of excavators. In the event that rock head is encountered rock breaking equipment will be required, thus increasing noise pollution during construction.

The noise pollution levels would significantly be controlled when the scheme is within a cutting.

5.7 Health and safety

5.7.1 Overbridge

The relaxation from standard for the vertical highway alignment of the crest curvature is contrary to TD9/93 which states that a relaxation or departure from standards is not permitted at an approach to a junction.

Not sure that a relaxation from standard would “significantly” restrict stopping site distance, however in combination with the downhill approach to the junction it is potentially less safe than going under the railway;

- This option involves more work close to the live railway (presumably much of the substructure would be built close to, but outside the railway land) with the increased risk of an accident impacting on the railway;

- There would be considerable works required over the live railway once the basic deck of the structure was in place in order to complete the construction of the bridge.

5.7.2 Underbridge

- The whole of the structure could be built off line (as Bingham Railway Bridge on the A46) which would minimise the work adjacent to the live railway;
- Virtually all of the works on/around the railway would be carried out during blockade;
- This alignment removes the downhill approach to the re-aligned A6 junction.

5.8 Visual Impact

5.8.1 Overbridge

The embankment required for the SEMMMS Relief Road highway alignment to cross over the railway will have a significant adverse visual impact on its surroundings. It is estimated that the road level will be up to 12m above current existing ground level.

Due to its close proximity to a residential area, the embankment will block the view of the open landscape that a number of houses currently face. With the road elevated to level, traffic will be clearly visible to nearby residents.

Sight lines for railway will be severely impeded by the embankment and overbridge crossing. This may have an impact on signalling provisions in the area.

5.8.2 Underbridge

If the SEMMMS Relief road highway alignment is positioned in a cutting it the road and associated traffic will be hidden from view. The view of the flat open farmland and the woodland beyond will be less impacted. Sight lines on the railway will remain unaffected.

5.9 Ownership and Liabilities

5.9.1 Overbridge

The Overline bridge would be funded and constructed within the SEMMMS Project with Technical Approval by both Network Rail and the respective Council.

The Overline bridge would be owned and maintained by the respective Council.

The cost of future Network Rail periodic inspections (earth bond continuity etc.) would be paid by the SEMMMS Project as a lump sum cost to cover the design life of the structure.

5.9.2 Underbridge

The Underline bridge would be funded and constructed within the SEMMMS Project with Technical Approval by Network Rail.

The Underline bridge would be owned and maintained by Network Rail with a commuted sum paid by the SEMMMS Project as a lump sum cost to cover the design life of the structure.

6. CONCLUSIONS

6.1 Scheme going over or under the railway line

The location of the new road way and junction is on the edge of ‘green belt’ and deserves due consideration in order to mitigate its environmental impact.

Two options have been considered, one locating the new road route within a cutting, running beneath the old A6 and the main railway line and an alternative option of a similar route running along a raised embankment over the old A6 and railway line. The height of such an embankment is determined by the clearances over the railway.

Any raised embankment used as part of a ‘flyover’ would significantly impact on the general relatively flat landscape, whereas the use of a cutting will effectively conceal the road and have negligible effect on the general views and vistas across the area.

Also if the roadway were to be located within a cutting, its noise pollution levels would be significantly controlled whereas a raised roadway set upon an essentially high embankment would broadcast noise to adjacent residential property and would invariably require some acoustic roadside barriers in order to limit the worst of the traffic generated noise.

Either option would of course be effectively landscaped to the satisfaction of the Planning and Environmental bodies, but the version using a cutting would have the least visual concerns.

Any potential problems in respect of drainage, flooding and lighting would be adequately dealt with either option. Any underpass involved with the ‘cutting’ option would of course require some minimal ‘daytime’ street lighting but any general road lighting would be primarily concealed within the cutting, whereas any road-lighting located on the raised embankment, despite control measures, would still add to the general level of light pollution in the area.

It should be noted that the road under the Rail Line also provides a potential means of reducing incidents and risk at the existing level crossing, east of proposed bridge.

The proposal locating the new road within a cutting is the preferred option.

APPENDIX A

Location Plan

south east manchester multi modal strategy
semmms
STOCKPORT METROPOLITAN BOROUGH COUNCIL
Cheshire East Council
MANCHESTER CITY COUNCIL

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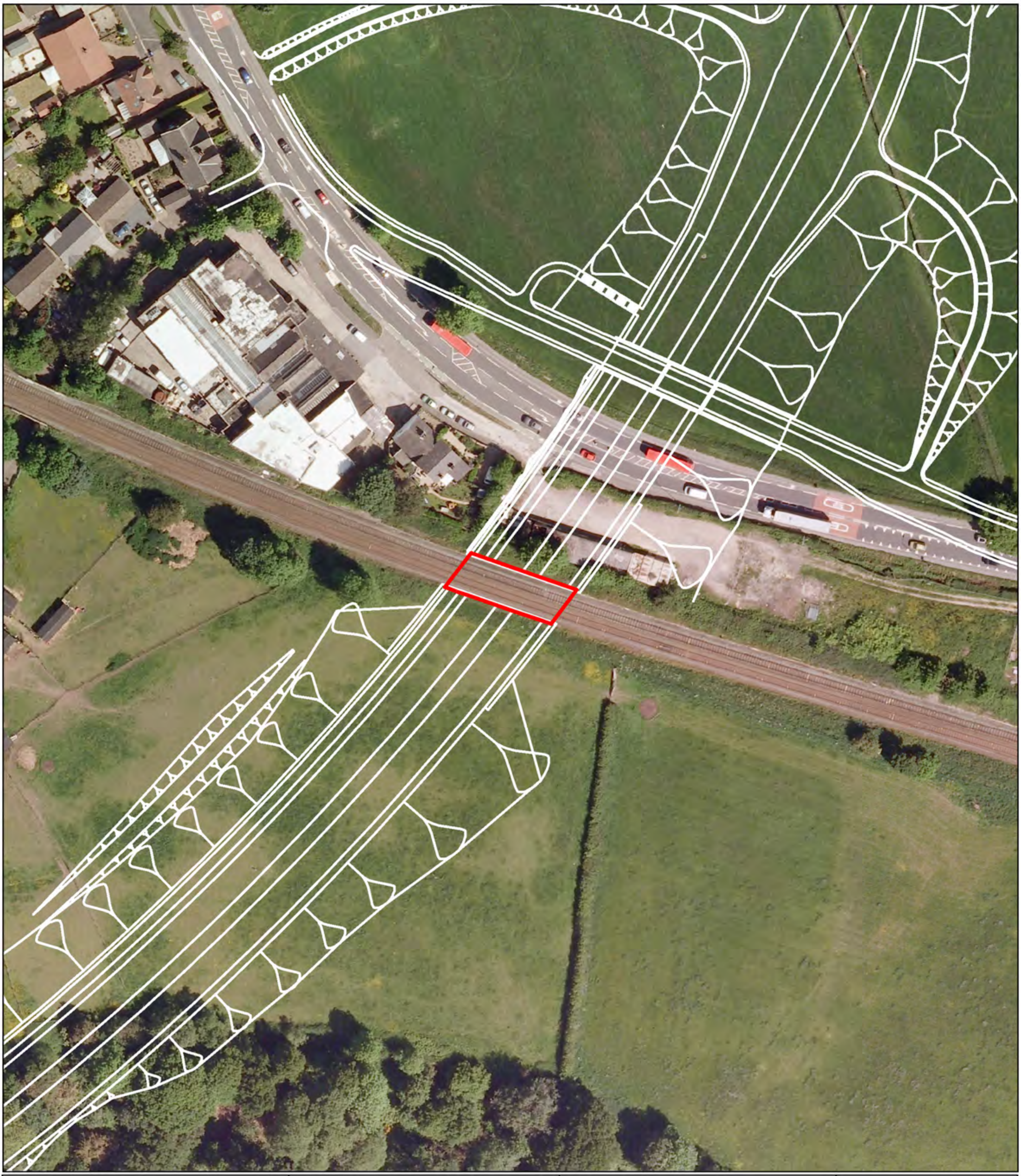

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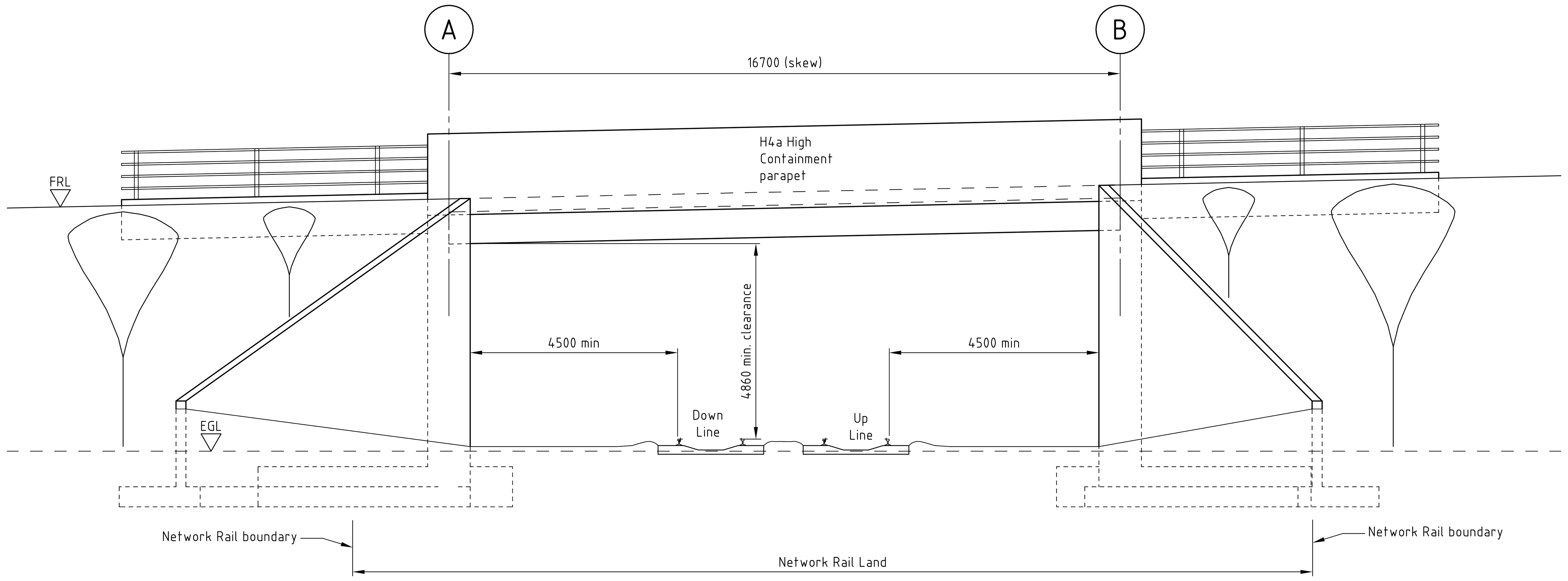
APPENDIX B

Drawings for the Overbridge and Underbridge Options



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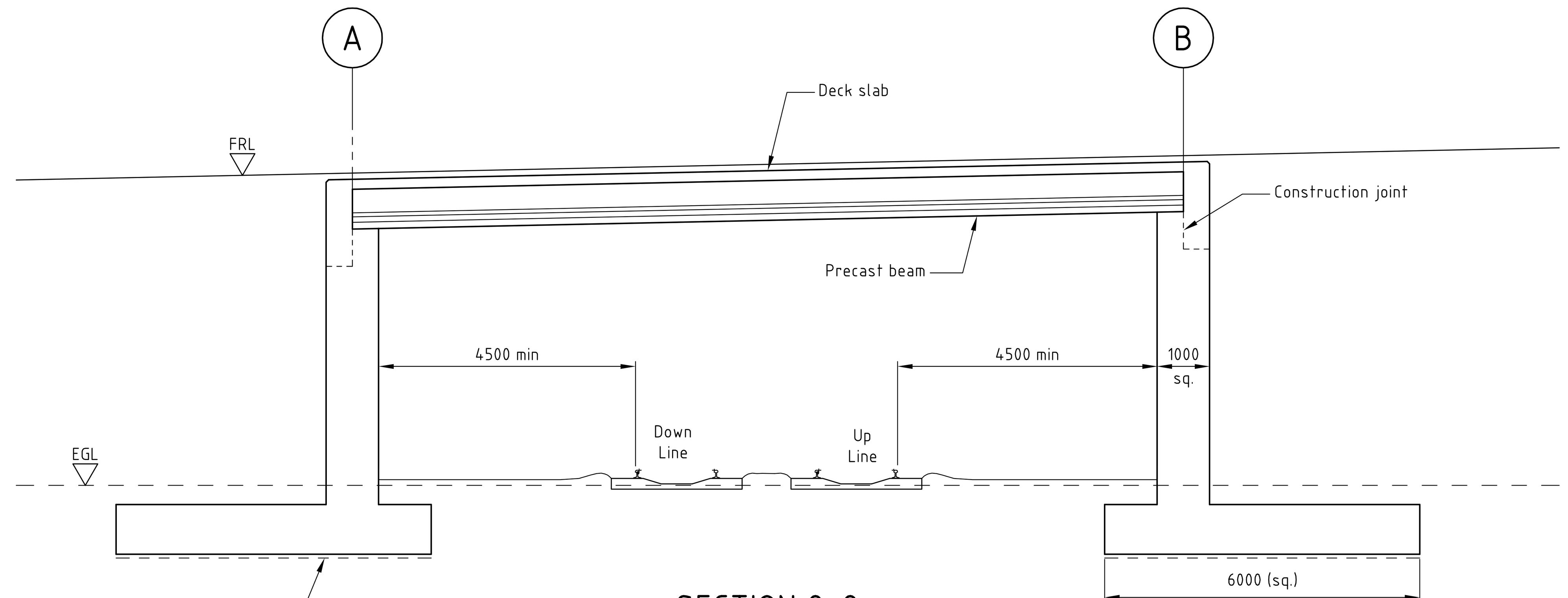
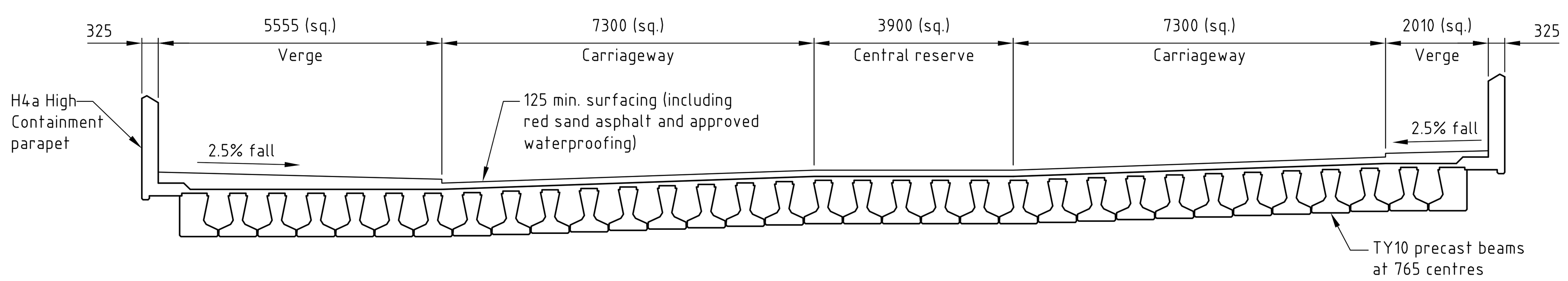
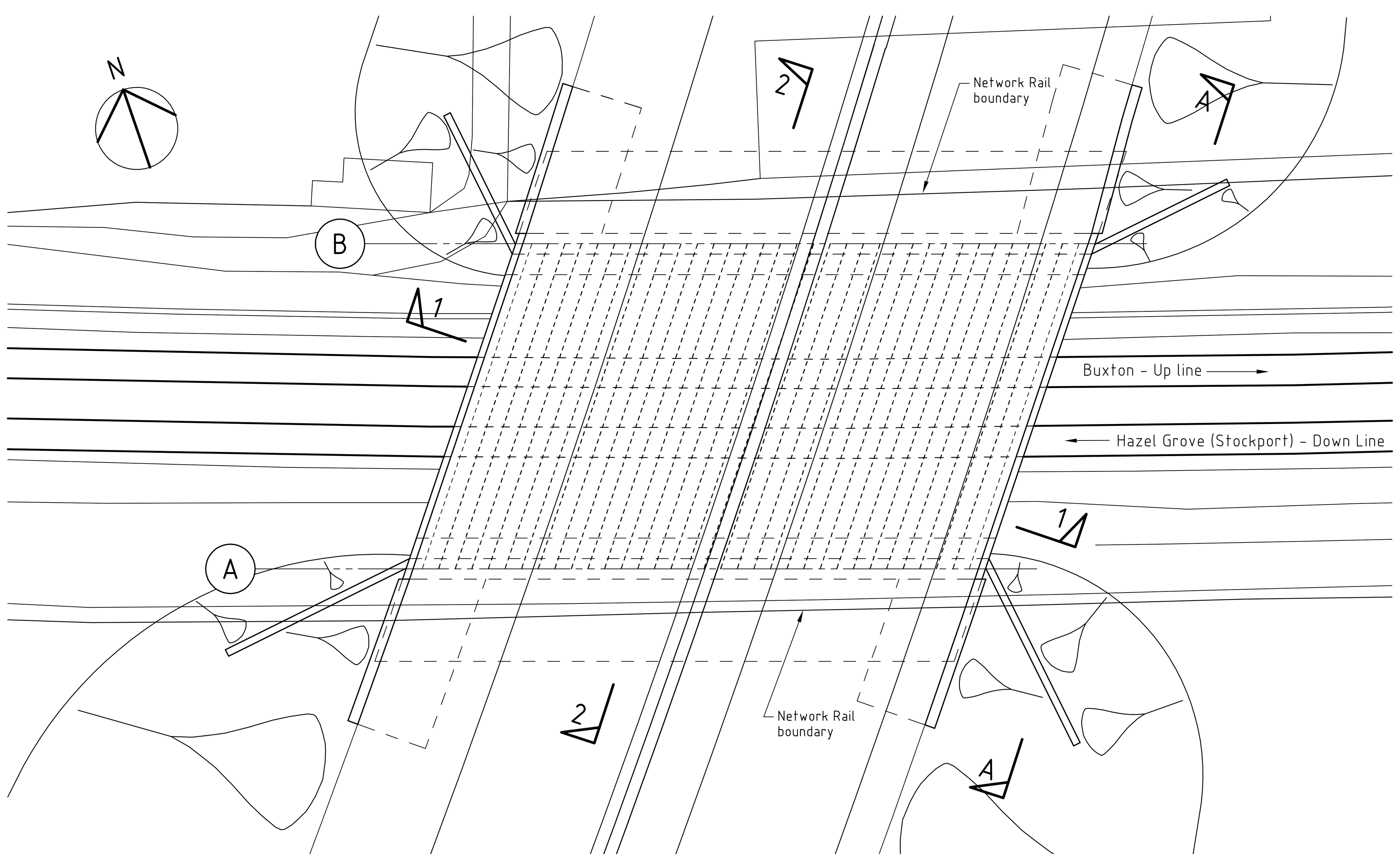


SECTION 2-2
(1:100)



SECTION 1-1
(1:100)



PLAN
(1:200)

NOTES

1. This drawing has been produced based on the latest MX highway model - Draft Design Freeze 5, as provided by the client.
2. This drawing has been produced mainly for the purpose of planning application and the feasibility study.
3. Levels are in metres and above Ordnance Datum.
4. All dimensions are in millimetres.
5. The option shown in this drawing is not for construction
6. The foundation type shown on the drawing is based on the latest available geotechnical information.
7. Basic preliminary design has been undertaken to determine the geometry of the section sizes as per client's instruction.
8. The Railway line is not electrified.
9. Mileage : 3 miles 32 yards

DRAFT

Rev.	Drawn	Checked	Date	Revision Details

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Job Title

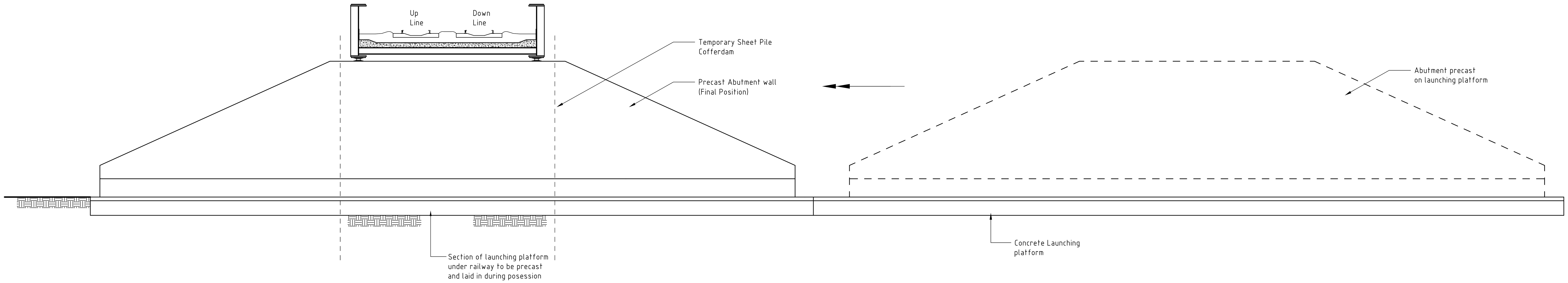
SEMMMS
RELIEF ROAD SCHEME
A6 - AIRPORT

Drawing Title

HAZEL GROVE/BUXTON
RAILWAY OVER LINE BRIDGE
OPTION

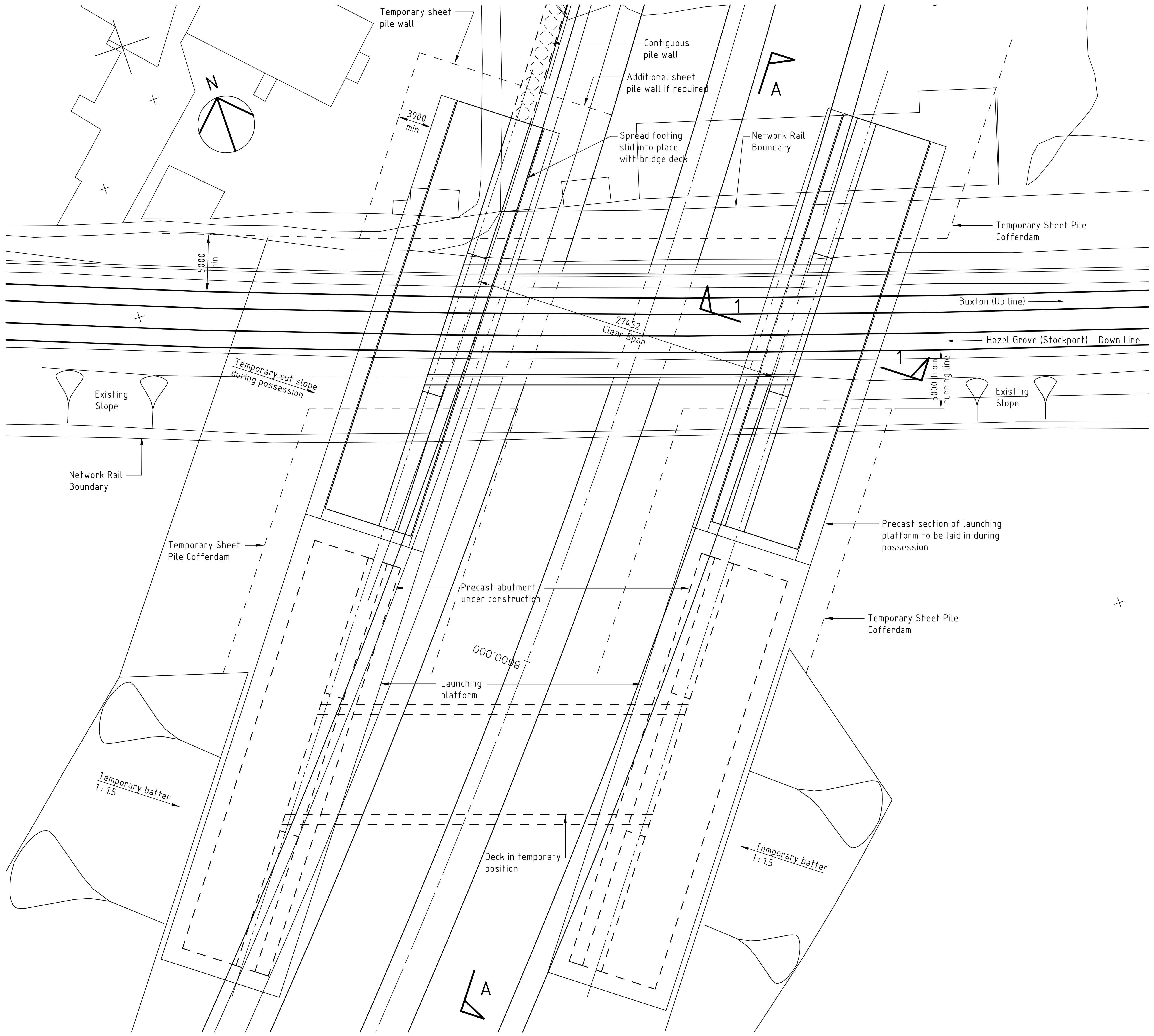
Drawn	Engineer	Checked	Approved
BDJ	OP	OP/NS	NS
Date DEC '11	Date DEC '11	Date DEC '11	Date DEC '11
Size A1	Scale AS SHOWN		
SCG No.	Filename		

Drawing No. 1007/3D/DF5/A6-MA/B002/702-1A | Revision



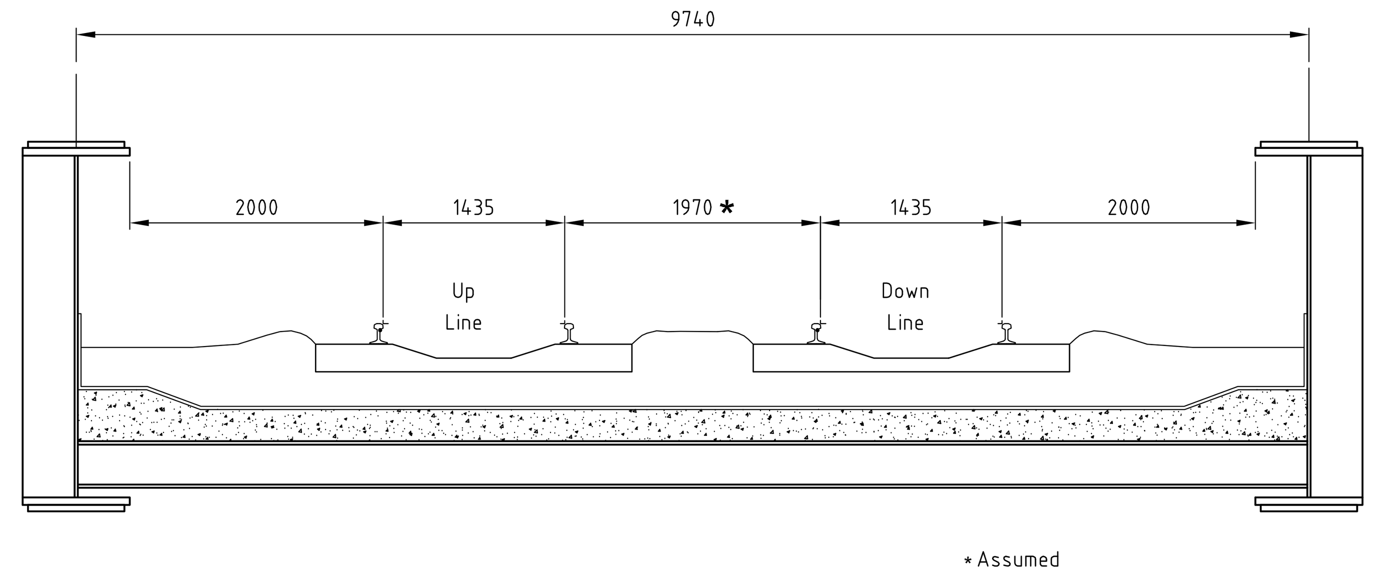
ELEVATION A-A

(1:125)



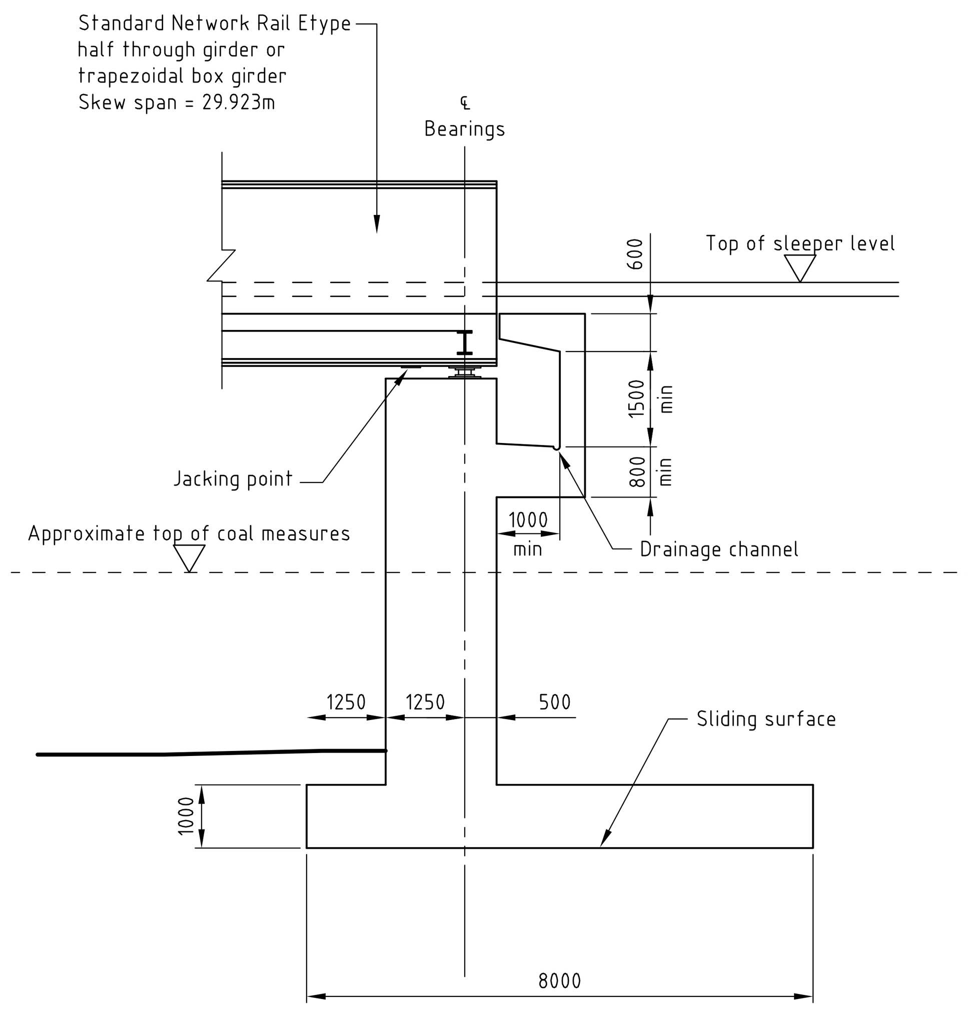
PLAN

(1:250)



Typical Deck Cross Section

(1:50)



SECTION 1-1

(1:100)

NOTES

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4. All dimensions are in millimetres.
5. The option shown in this drawing is not for construction
6. The foundation type shown on the drawing is based on the latest available geotechnical information.
7. Basic preliminary design has been undertaken to determine the geometry of the section sizes as per client's instruction.
8. The Railway line is not electrified.
9. Mileage : 3 miles 32 yards
10. The arrangement of the temporary sheet pile walls is indicative and may be subject to change during the detail design stage.

DRAFT

Rev.	Drawn	Checked	Date	Revision Details

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Job Title

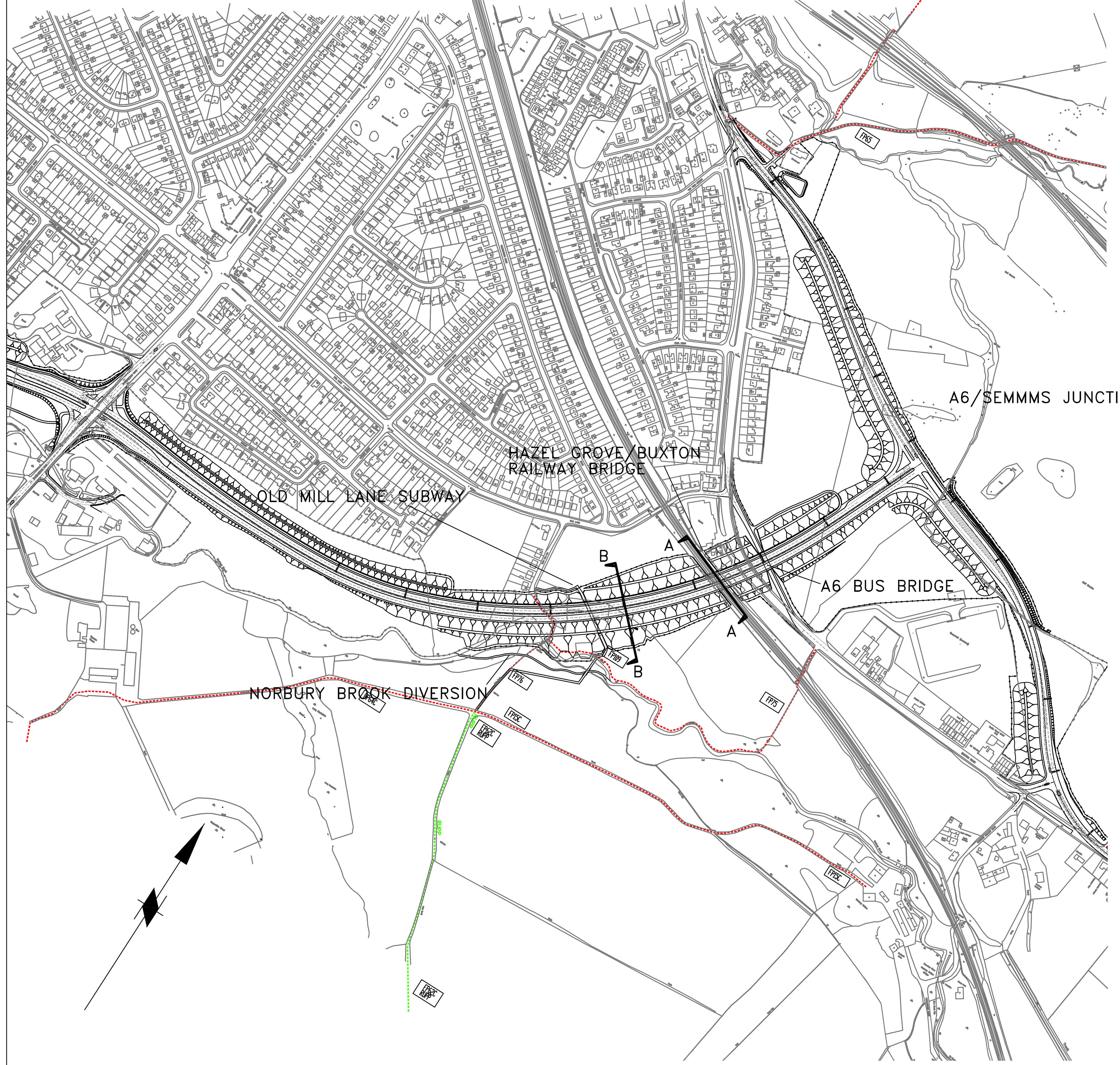
SEMMMS
RELIEF ROAD SCHEME
A6 - AIRPORT

Drawing Title

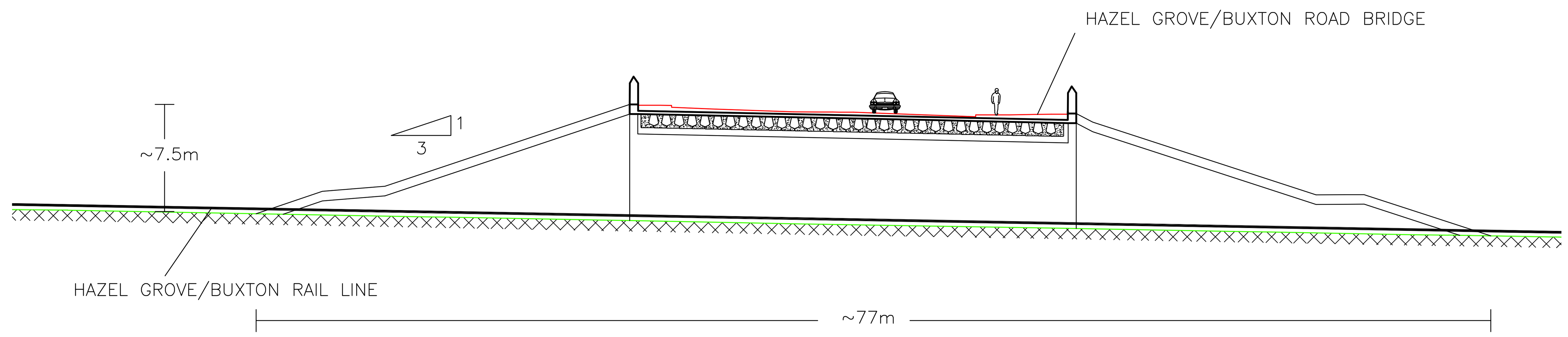
HAZEL GROVE/BUXTON
RAILWAY UNDER LINE BRIDGE
OPTION

Drawn	Engineer	Checked	Approved
DSH	OP	NS	NS
Date DEC '11	Date DEC '11	Date DEC '11	Date DEC '11
Size A1	Scale AS SHOWN		
SCG No.	Filename		

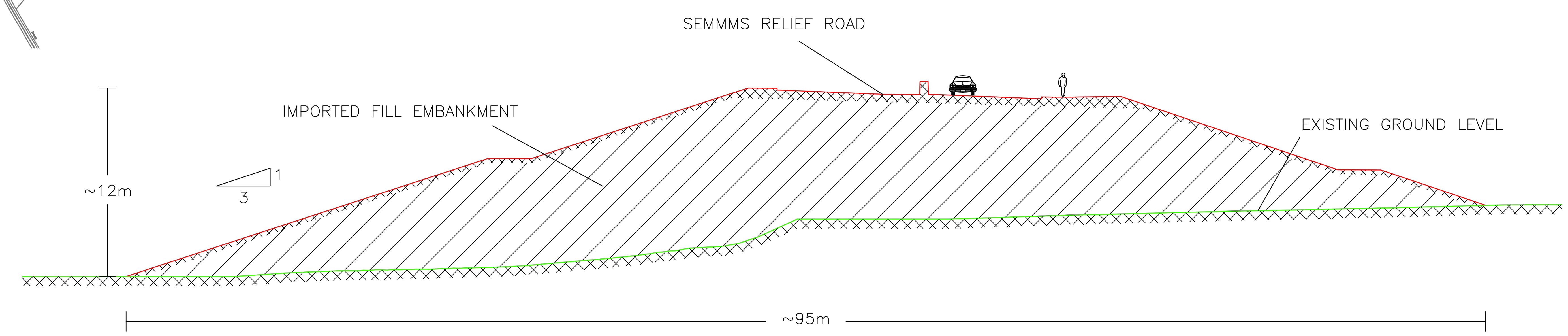
Drawing No.	Revision
1007/3D/DF5/A6-MA/B002/702-1B	



PLAN ON SCHEME (SCALE 1:5000)



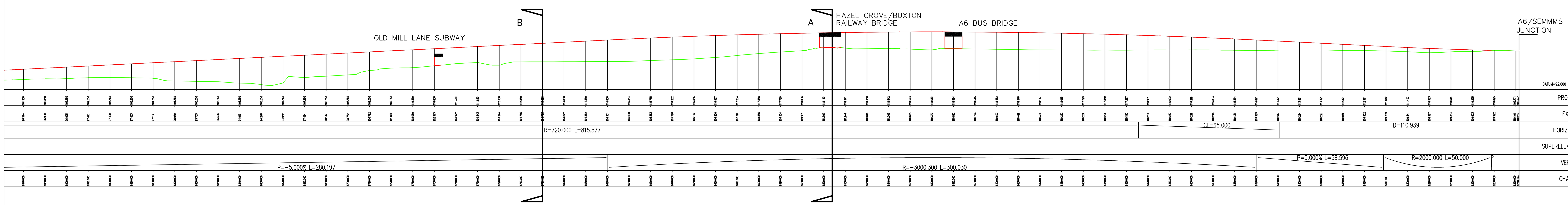
SECTION A–A ALONG HAZEL GROVE BUXTON LINE (SCALE 1:250)



SECTION B–B THROUGH EMBANKMENT (SCALE 1:250)

HIGHWAY DESIGN SPEED 85KPH (50mph SPEED LIMIT)
DESIGN MANUAL FOR ROADS AND BRIDGES STIPULATES FOR THE ABOVE DESIGN SPEED
1. VERTICAL ALIGNMENT – DESIRABLE MIN CREST CURVE 5500m RADIUS
2. VERTICAL ALIGNMENT – DESIRABLE MAX 4% GRADE FOR ALL PURPOSE DUAL CARRIAGEWAYS
3. VERTICAL ALIGNMENT – NO REDUCTION IN DESIRABLE MIN SIGHT STOPPING DISTANCE ON THE APPROACH TO JUNCTIONS

THIS ALIGNMENT HAS THE FOLLOWING RELAXATION AND DEPARTURES
1. VERTICAL ALIGNMENT – CREST CURVE 3000m RADIUS USED TO REDUCE EXTENT AND ENVIRONMENTAL IMPACT OF EARTHWORKS (departure when linked with item 3 below)
2. VERTICAL ALIGNMENT – A MAX GRADE OF 5% (relaxation)
3. VERTICAL ALIGNMENT – SIGHT STOPPING DISTANCE REDUCED (departure)



SECTION ALONG SEMMMS ALIGNMENT (SCALE 1:1000)

NOTES

1. This drawing has been produced based on the latest MX highway model – Draft Design Freeze 5, as provided by the client.
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4. All dimensions are in millimetres.
5. The option shown in this drawing is not for construction
6. The foundation type shown on the drawing is based on the latest available geotechnical information.

KEY

- EXISTING DEFINITIVE PROW
- EXISTING NON-DEFINITIVE PROW
- EXISTING BRIDLEWAY
- PROPOSED DEFINITIVE PROW
- EXISTING PROW STOPPED UP

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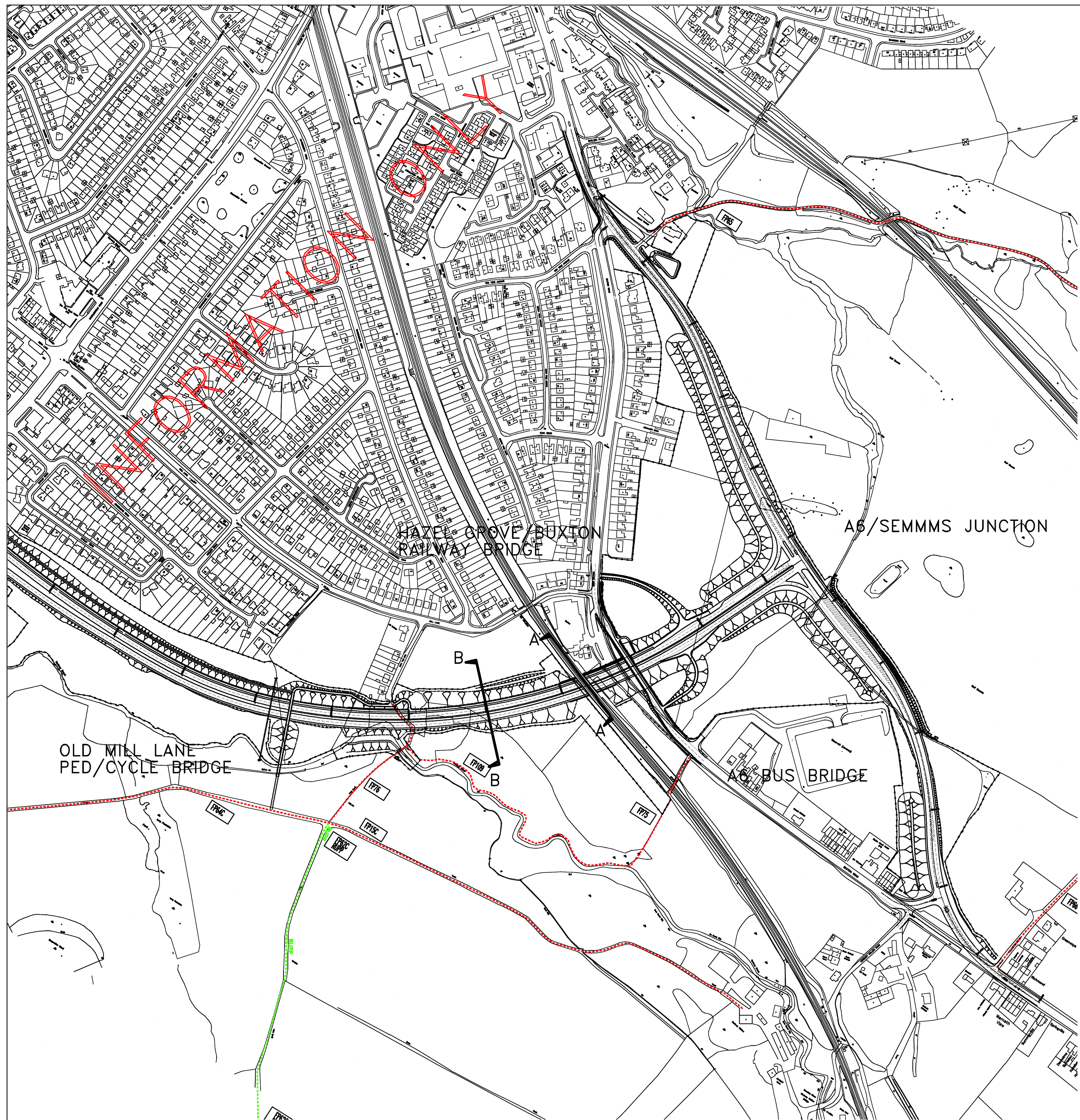
Job Title
SEMMMS
RELIEF ROAD SCHEME
A6 - AIRPORT

Drawing Title
HAZEL GROVE/BUXTON
HIGHWAY ALIGNMENT FOR THE
RAILWAY OVER LINE OPTION

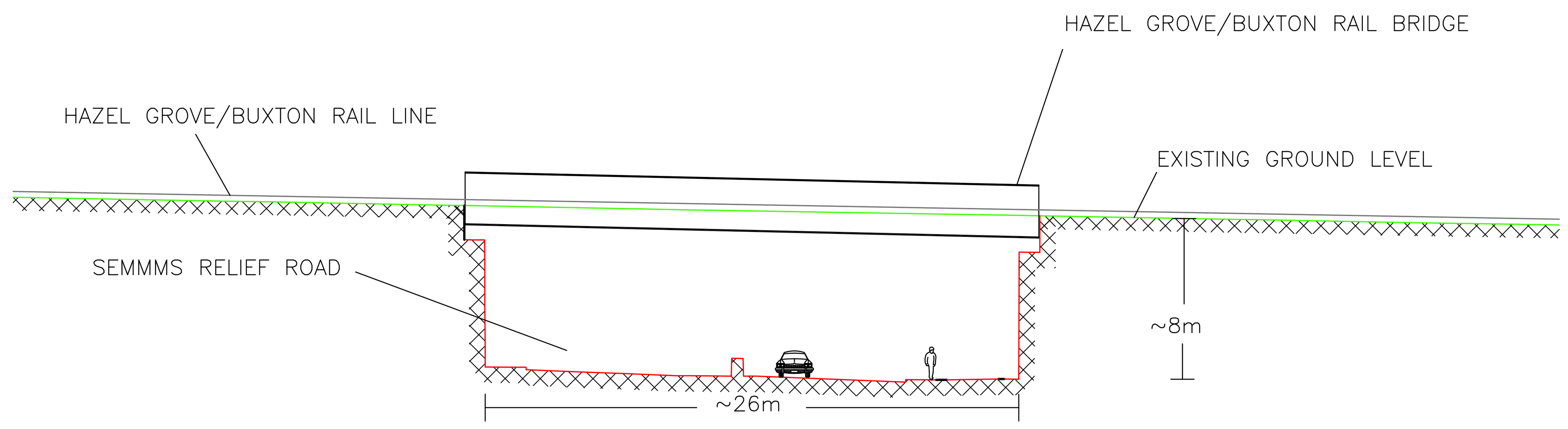
Drawn	Engineer	Checked	Approved
LF	LF	NS	NS
Date 12/12/11	Date 12/12/11	Date 21/12/11	Date 21/12/11

Size	Scale
A1	AS SHOWN
SCG No.	Filename

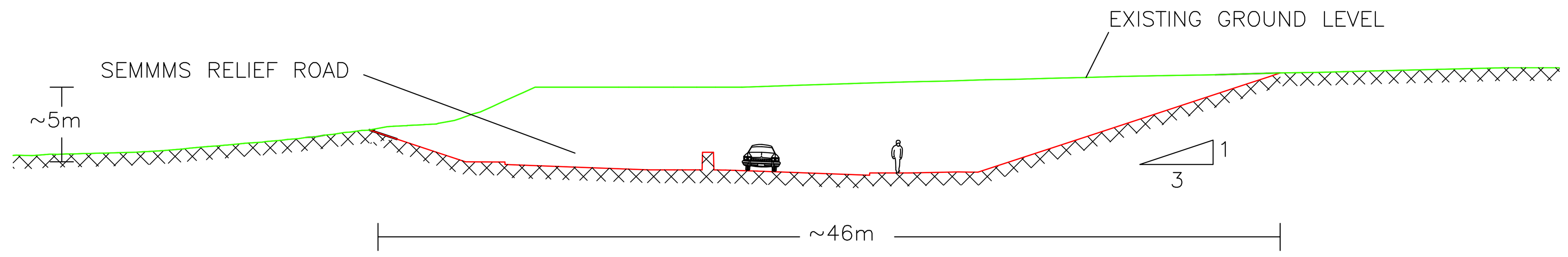
Drawing No.	Revision
1007/3D/DF5/A6-MA/B002/702-2A	



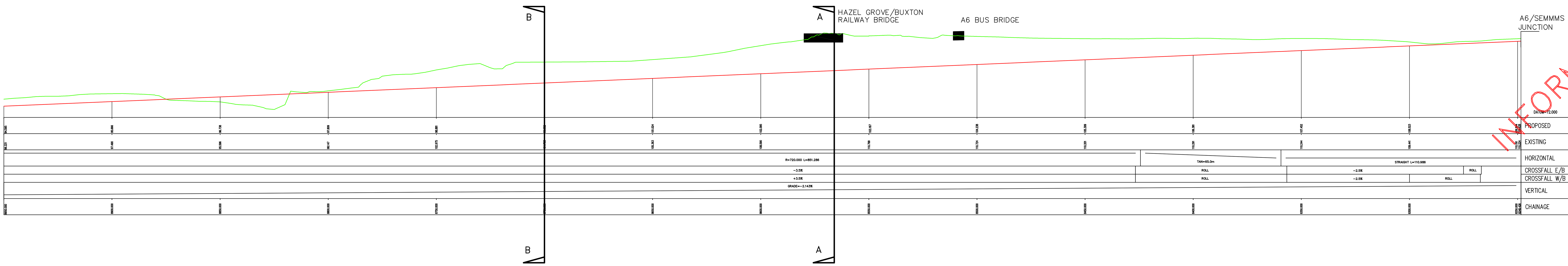
PLAN ON SCHEME (SCALE 1:5000)



SECTION A–A ALONG HAZEL GROVE BUXTON LINE (SCALE 1:250)



SECTION B–B THROUGH CUTTING (SCALE 1:250)



SECTION ALONG SEMMMS ALIGNMENT (SCALE 1:1000)

NOTES

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5. The option shown in this drawing is not for construction
6. The foundation type shown on the drawing is based on the latest available geotechnical information.

KEY

- EXISTING DEFINITIVE PROW
- EXISTING NON-DEFINITIVE PROW
- EXISTING BRIDLEWAY

DRAFT

Rev.	Drawn	Checked	Date	Revision Details

south east manchester multi modal strategy
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Job Title

SEMMMS
RELIEF ROAD SCHEME
A6 - AIRPORT

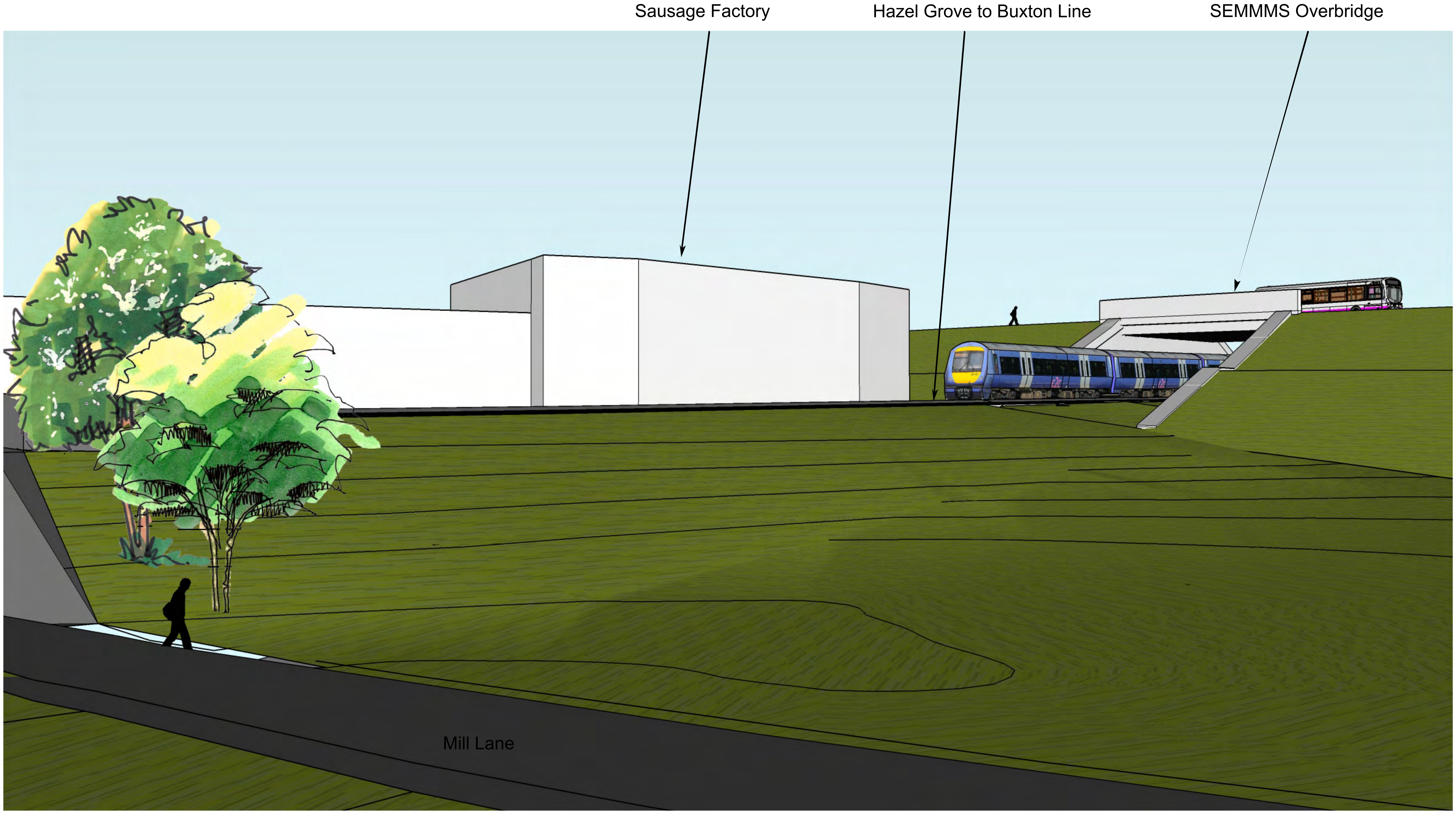
Drawing Title

HAZEL GROVE/BUXTON
HIGHWAY ALIGNMENT FOR THE
RAILWAY UNDER LINE OPTION

Drawn	Engineer	Checked	Approved
LF	LF	NS	NS
Date 14/03/12	Date 14/03/12	Date 14/03/12	Date 14/03/12
Size A1	Scale AS SHOWN		
SCG No.	Filename		
Drawing No. 1007/3D/DF5/A6-MA/B002/702-2B			Revision

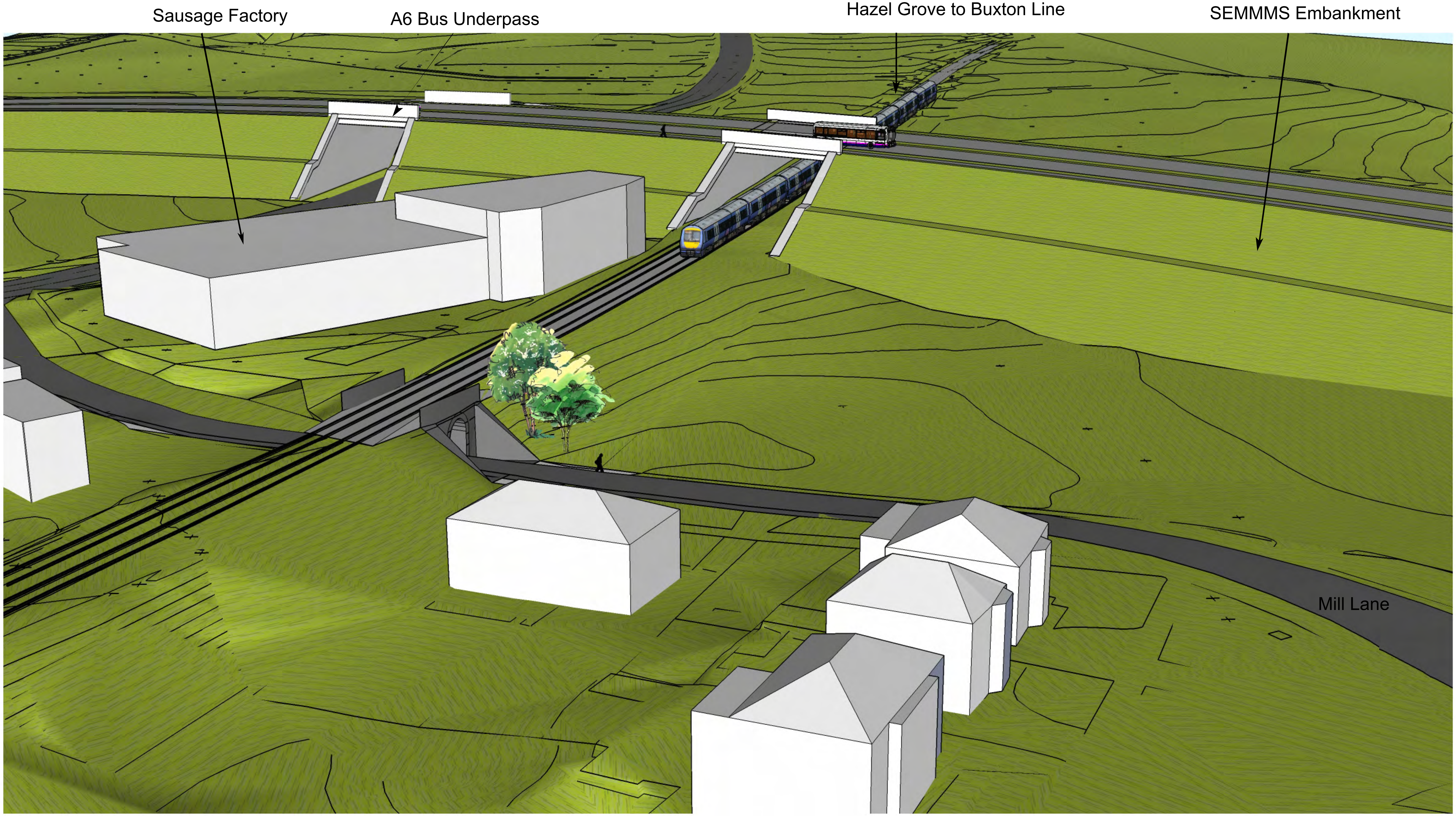
Appendix C

3D Models of the Overbridge and Underbridge Options



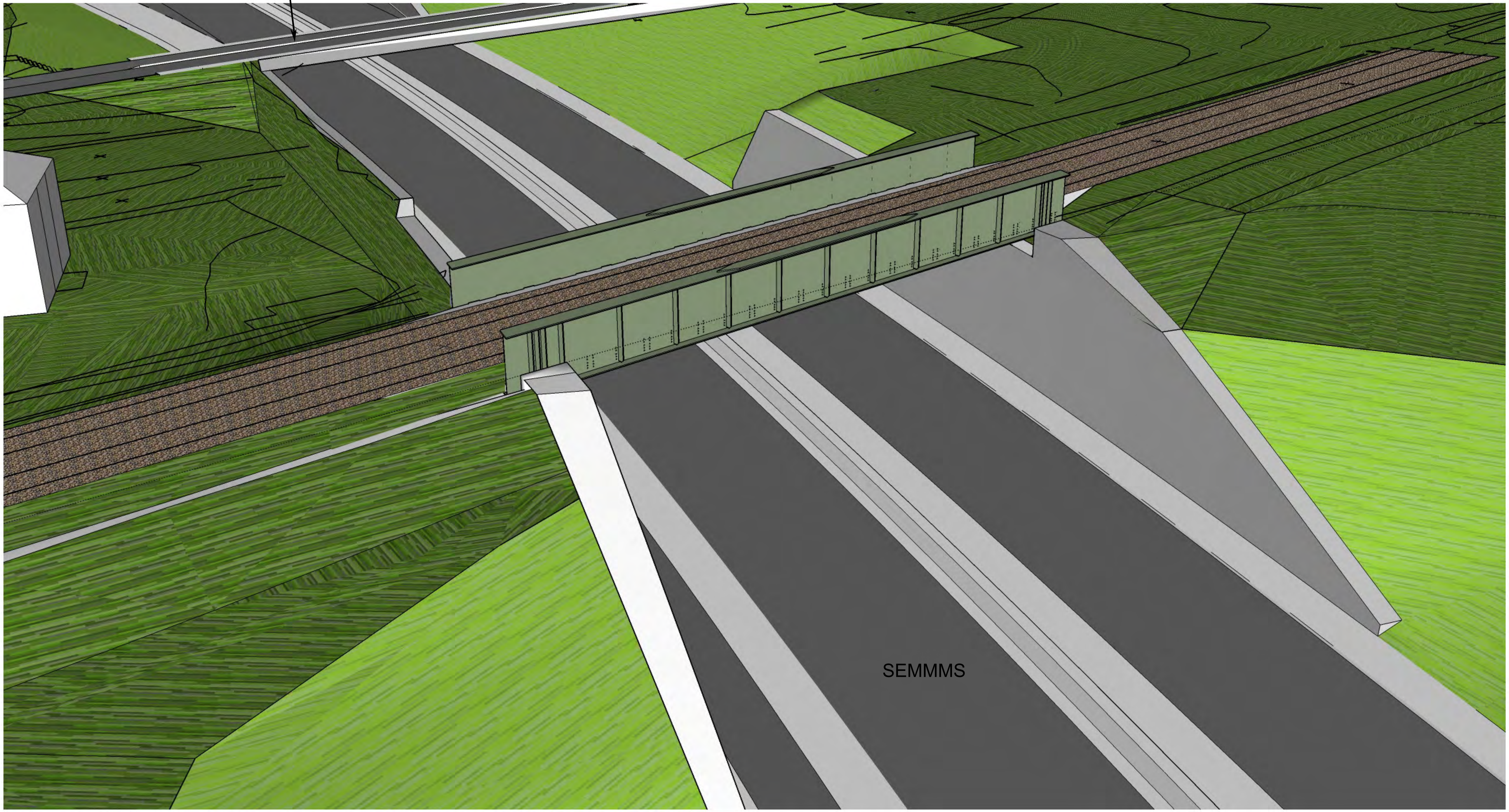
Hazel Grove to Buxton Line Overbridge
View towards Overbridge from Residential Area

FIGURE 1



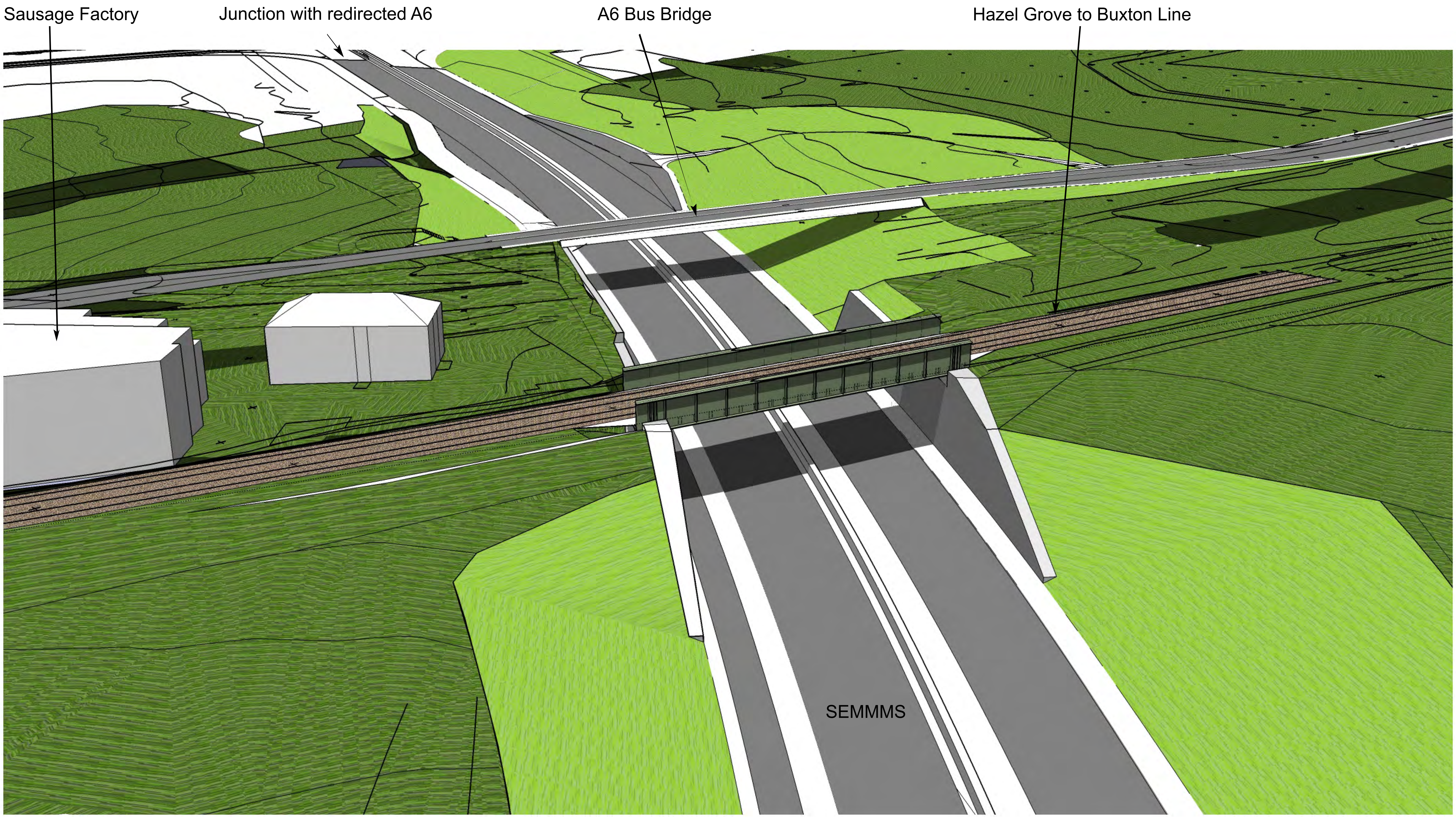
Hazel Grove to Buxton Line Overbridge
Aerial View Looking East

FIGURE 2



Hazel Grove to Buxton Line Underbridge
Elevation Looking East

FIGURE 3



Hazel Grove to Buxton Line Underbridge
Aerial View

FIGURE 4