

Tyrone - Cavan Interconnector

Volume 3 - Part 5 of 5

Consolidated Environmental Statement
Appendices



Part funded by
EU TEN-E Initiative

NI Northern Ireland
Electricity



Produced in association with:



9th Floor
The Clarence West Building
2 Clarence Street West
Belfast
BT2 7GP

Telephone: +44 (0)28 9060 7200
Fax: +44 (0)28 9060 7399
Website: www.aecom.com

**This document is Volume 3 : Appendices Part 5 of the
Tyrone – Cavan Interconnector Environmental Statement (ES).**
The whole ES consists of a number of documents printed separately and should be read
together.

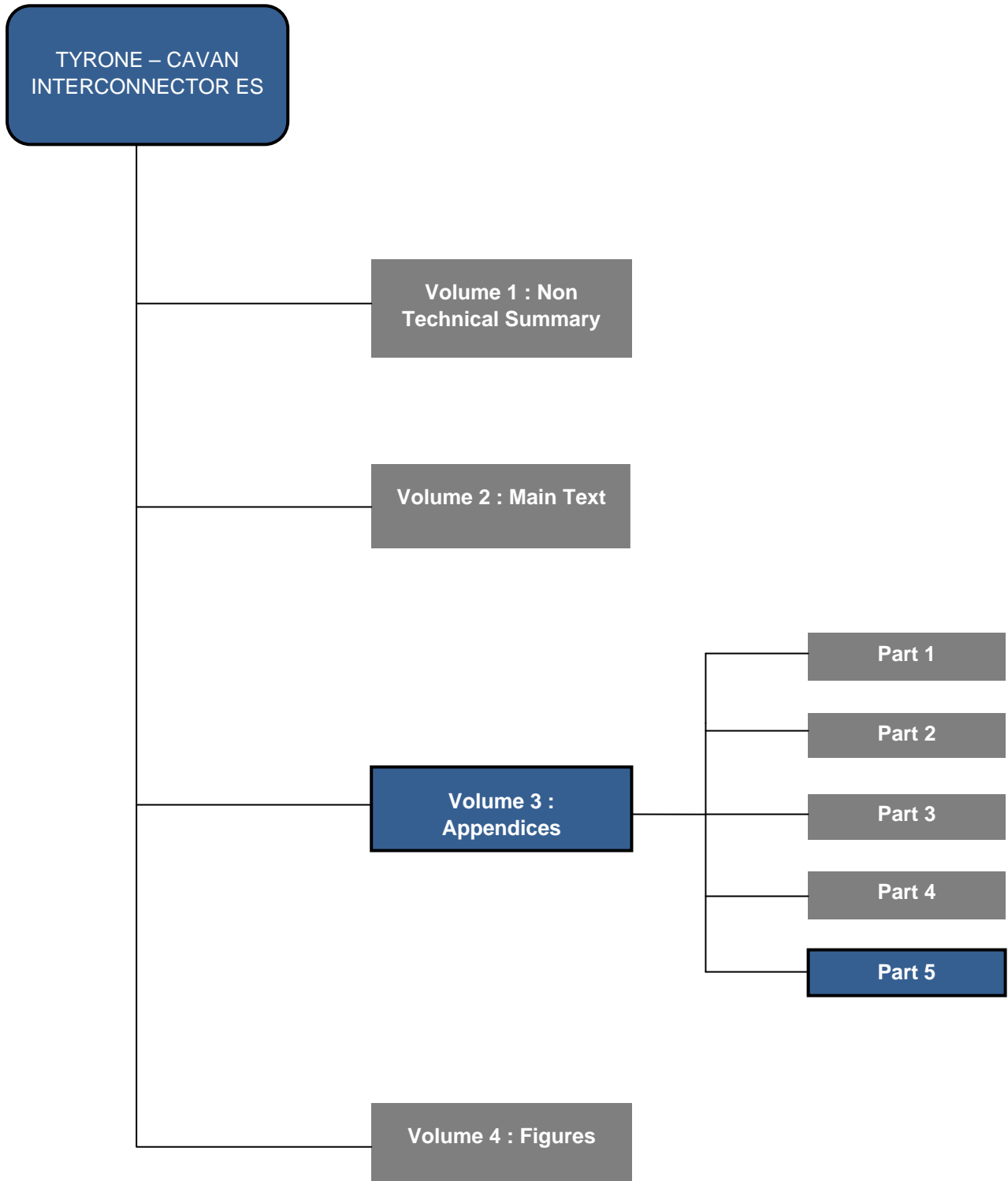


Table of contents

Volume 3 Appendices Part 1

Appendix 2A	Utility Regulator Letter
Appendix 4A	ECOFYS Letter
Appendix 4B	PB Power Report (2013)
Appendix 4C	Turleenan - Kingscourt 400kV Project Visual Assessment of New Tower Outline 2007
Appendix 5A	Outline Construction Environmental Management Plan (OCEMP)
Appendix 5B	Substation Drainage Technical Note
Appendix 5C	Minimum and Maximum 400kV Tower Foundations
Appendix 5D	Substation Planting Schedule
Appendix 6A	Section 1: Consultation Summary Response Tables and Responses

Volume 3 Appendices Part 2

Appendix 6A	Section 2: Consultation Responses 2006 - 2013
-------------	---

Volume 3 Appendices Part 3

Appendix 7A	DECC Code of Practice
Appendix 7B	Email from St. Jude Medical
Appendix 8A	Legislation and Planning Policy
Appendix 8B	NIEA WMU Response
Appendix 9A	Details of ASSI designations
Appendix 9B	Historical Ordnance Survey Plans
Appendix 10A	Consultations
Appendix 10B	Bat Appendices
Appendix 10C	Phase 1 Habitat Survey Target Notes
Appendix 10D	Plant Species List

Volume 3 Appendices Part 4

- Appendix 10E Badger Appendix
- Appendix 10F Breeding Birds
- Appendix 10G Wintering Birds
- Appendix 10H Article 6 ToLS
- Appendix 10I Conservation Status
- Appendix 11A Explanation of Noise Terms
- Appendix 11B Line Noise Applet Prediction Notes
- Appendix 11C Background noise levels recorded along the proposed overhead line route and substation in 2005
- Appendix 12A Cultural Heritage Features
- Appendix 12B Criteria for Impact Significance
- Appendix 12C Ulster Museum Records
- Appendix 12D Aerial Photographs
- Appendix 12E Cultural Heritage Features within Wider Study Area.
- Appendix 12F Built Heritage
- Appendix 13A Individual Properties Assessment Table
- Appendix 13B Cumulative Assessment Table
- Appendix 14A Summary of Individual Land Parcel Impacts

Volume 3 Appendices Part 5

- Appendix 17A Turleenan Substation Flood Risk and Surface Water Management
- Appendix 18A Transport Assessment

For ease of use this document has been printed in A4 format. Should a larger format be required, an electronic version is available at www.nie.co.uk.

Alternatively a printed A3 version may be obtained by contacting NIE at:

NIE Major Projects
120 Malone Road, Belfast, BT9 5HT
Tel: 08457 643 643

Appendix 17A - Turleenan Substation Flood Risk and Surface Water Management

**Turleenan Substation
Flood Risk and Surface Water Management Strategy**

Northern Ireland Electricity
10th September 2008

As of 4th May 2009, Faber Maunsell Limited has changed its name to AECOM Limited and has re-branded as AECOM, as part of our parent company's strategy to integrate across business lines and regions globally.

AECOM is a global provider of professional technical and management support services with over 43,000 people in more than 100 countries and is a leader in the delivery of Building Engineering, Transportation, Water, Environment, Programme Management, Energy and Planning & Design services. As a result of this global integration process, we can provide a broad array of solutions, through numerous geographic locations, with highly capable staff and cutting-edge technologies to address your needs and the challenges you face.

Though our name is changing, our commitment to our clients and their projects remains the same.

Our people working with you will continue to work with you. Our goal remains to continue providing clients with high-quality, responsive service and to make this organisational change transparent to you as we move forward.

Some material contained within this document may refer to our previous name Faber Maunsell, but is also applicable to AECOM.

www.aecom.com

Prepared by:

Peter Robinson
Associate Director

Approved by:

Graham Knott
Regional Director

Turleenan Substation

Flood Risk and Surface Water Management Strategy

Rev No	Comments	Checked by	Approved by	Date
1	Draft Report	PMR		10/09/08
2	Revised Draft following amendments to access road route	PMR		27/10/08
3	Final Report	PMR	GK	05/12/08
4	Amended to reflect revised layout of development	PMR	GK	29/07/09
5	Updated following review comments	PMR		26/08/09

Dunedin House, 25 Ravelston Terrace, Edinburgh, EH4 3TP
Telephone: 0131 311 4000 Fax: 0131 311 4090 Website: <http://www.aecom.com>

Job No 60032220

Reference 60032220/EDI026

Date Created 15/08/2009

This document has been prepared by AECOM Limited ("AECOM") for the sole use of our client (the "Client") and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document.

No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1	Introduction	1
1.1	Background.....	1
1.2	Scope.....	1
1.3	Drawings	2
2	Planning Context.....	3
2.1	Planning Policy	3
2.2	Planning Considerations.....	3
2.3	Site Selection and Layout Design.....	3
3	Site Description	5
3.1	Existing Site	5
3.2	Proposed Development	5
4	Flood Risk Assessment.....	6
4.1	Existing Flood Risk	6
4.2	Future Flood Risk.....	7
5	Conclusions.....	9
5.1	Flooding	9
5.2	Drainage	9
6	Recommendations	11
7	Technical References	13

APPENDIX A – FIGURES

APPENDIX B – FLUVIAL FLOOD RISK

APPENDIX C – SURFACE WATER MANAGEMENT STRATEGY

Executive Summary

This report has been produced for the purpose of presenting the findings of a Flood Risk Assessment and Surface Water Management Strategy, undertaken by AECOM, for Northern Ireland Electricity's proposed development of the Turleenan Substation. This report has been prepared to support a Planning Application for the substation as part of wide scale proposals for the construction of a new strategic electricity connection between Northern Ireland and Eire.

The Flood Risk Assessment has been carried out following the guidance and requirements set out in Planning Policy Statement 15 (PPS15): *Planning and Flood Risk* and in consultation with the Rivers Agency and the Northern Ireland Planning Service.

The proposed application boundary of site of the substation includes land that is identified as being within the 1% AEP floodplain. However, the design of the substation has been carried out to ensure that the area of permanent development, incorporating the compound and access road, is out with the 1% AEP floodplain and the area within the 1% AEP floodplain is only to be used for additional drainage, landscaping and planting.

It is considered that there is a temporary risk of groundwater flooding during the construction phase.

As with any development there is a potential risk of increasing flooding elsewhere through increased surface water runoff. Additional mitigation has been identified and incorporated into the design to provide appropriate Sustainable Drainage Systems to ensure that the development will not result in any increase in flood risk elsewhere as a result of increased surface water runoff.

The substation and connection can be considered of regional and national importance and also classified as essential infrastructure it is considered appropriate for the development to be permitted, providing that appropriate mitigation measures are implemented.

The residual probability of flooding to the site has been assessed and is considered to be substantially less than 1% annually and, consequently, the proposed development and associated mitigation measures are considered to satisfy the requirements of PPS15 and are appropriate.

Glossary

FRA – Flood Risk Assessment

SWMS – Surface Water Management Strategy

RA – Rivers Agency

Q100 – the 100 year return period flood event

AEP – Annual Exceedence Probability refers to the statistical probability that an event may be exceeded in any single year. 1% AEP is equivalent to a 100 year return period event and 0.5% a 200 year event etc.

PPS15 – Planning Policy Statement 15 *Planning and Flood Risk*

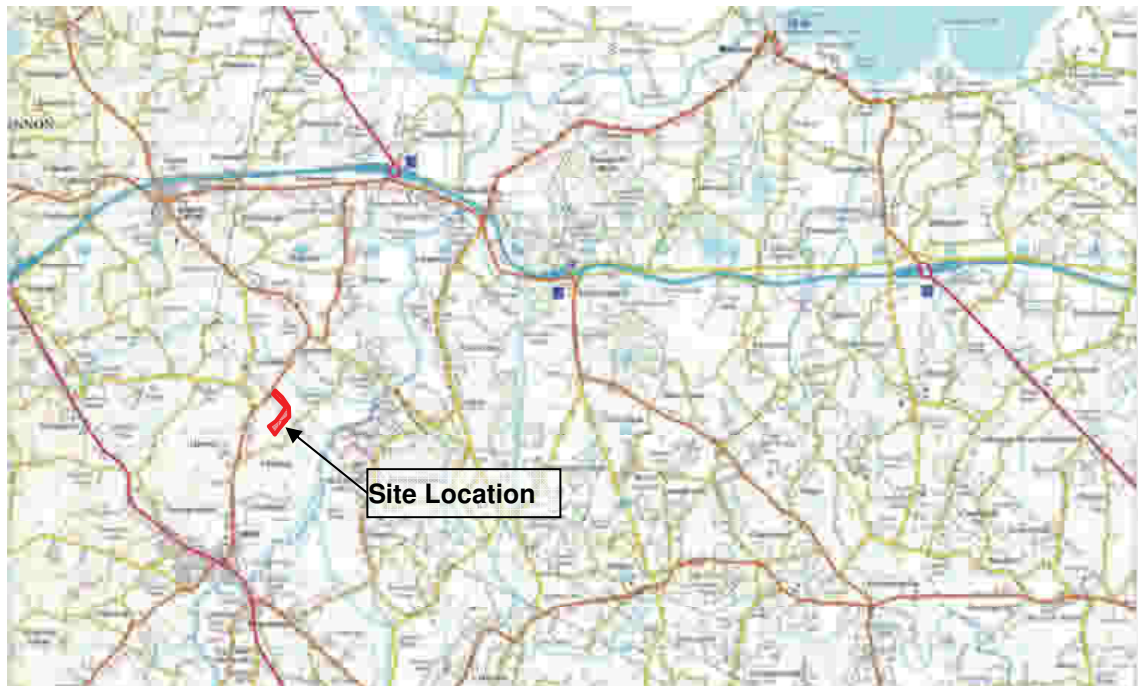
Floodplain – area adjacent to watercourses where water will flow and/or be stored during a time of flood

SuDS – Sustainable Drainage Systems

1 Introduction

- 1.1 Background**
- AECOM has been commissioned by Northern Ireland Electricity (NIE) to undertake a Flood Risk Assessment (FRA) incorporating a Surface Water Management Strategy (SWMS) in connection with the proposed development of the Turleenan Substation – ‘the site’. The site is located approximately (~) 2km North-North-East of Moy, County Tyrone, Northern Ireland, shown in **Figure 1.1**. The site is proposed to be utilised for a substation to connect the existing national power grid to a proposed North/South Interconnector power line. The substation and associated access roads will comprise of an area of ~ 5ha of development, within a site area of 22ha.

Figure 1.1 – Location Plan



Reproduced from the Ordnance Survey of Northern Ireland's map 2004 with the permission of the Controller of Her Majesty's Stationary Office. Licensee Number 20083

This report has been prepared to present the findings and results of the FRA and SWMS and is intended to be used as a supporting document for a Planning Application for the proposed development which comprises of the North/South Interconnector power line and the Turleenan Substation. This report has been prepared following consultation with the Rivers Agency and the Northern Ireland Planning Service on flooding issues and conforms to the requirements of Planning Policy Statement 15 (PPS15) - *Planning and Flood Risk*.

1.2 Scope

This report covers the following aspects:

- A description of the site and the proposed development (**Section 2**);
- Planning Context (**Section 3**);
- Flood Risk Assessment (FRA) (**Section 4**);
- Surface Water Management Strategy (SWMS) (**Section 5**);

- Conclusions (**Section 6**); and
- Recommendations (**Section 7**).

1.3

Drawings

The following drawings have been included within this report for reference purposes:

- **Figure 1.1** - Location plan;
- **Figure 2.1** - Potential Substation Sites
- **Figure 3.1** - Existing site plan and features
- **Figure 3.2** - Proposed Development Plan
- **Figure 4.1** - Existing 1% AEP Flood Extents
- **Figure 4.2** - Conceptual Surface Water Drainage System

2 Planning Context

2.1 Planning Policy

Consideration of Flood Risk is a requirement of planning control in Northern Ireland. The Department of the Environment is responsible for planning control and its agency, the Planning Service, administers its planning functions.

The Department's planning policies are issued through Planning Policy Statements and Planning Policy Statement 15 (PPS15) - *Planning and Flood Risk* sets out the appropriate policies with respect to flood risk.

2.2 Planning Considerations

The planning policies contained with PPS15 have been considered during the design of the overall scheme, with the majority of activities and development, due to their nature, considered to be at a low risk of flooding.

The major area of flood risk is associated with the infrastructure located at ground level, in particular the substation at Turleenan.

The main flooding policy consideration associated with the Turleenan Substation is that part of the application contains existing 1% AEP floodplain. The extent of the 1% AEP floodplain is shown on **Figure 4.1, Appendix A**.

Planning Policy FLD1 states that development will not be permitted in the floodplain unless it is of '*overriding regional importance*' or meets one of a range of exceptions.

In the case of the Turleenan Substation, it is considered that the scheme is of regional, if not national, importance and also fulfils the requirements of the following exception:

'development where location within a floodplain is essential for operational reasons for example, navigation and water based recreation uses or transport and utilities infrastructure which has to be there'.

In the case of the proposed Turleenan substation, due to the location of the existing overhead power lines and towers and the surrounding topography the proposed location is considered essential for the development, both in terms of operation, but also in terms of providing mitigation to other environmental considerations.

2.3 Site Selection and Layout Design

2.3.1 Site Selection

During the evolution and optioneering of the whole scheme a number of options have been considered for the route of the scheme and also the location for the substation. The criteria for the location of the substation require that it is adjacent to the existing overhead power lines to allow connection to the grid and that the location is selected to minimise the length of the connection and hence, the number of additional towers required.

The criteria that have been considered include economic requirements, but also a wide range of environmental and technical considerations, including flood risk.

Initially three sites for the substation were short listed, which are shown on **Figure 2.1, Appendix A**. Of these three options, Site 2 is considered to have the lowest flood risk, being located adjacent to, but out with the floodplain, whereas Sites 1 and 3 are located entirely within the floodplains of the River Rhone and River Blackwater respectively. Therefore, Site 2 has been selected as being the most appropriate for the location of the substation.

2.3.2 Site Layout and Design

The layout, local positioning and orientation of the substation has evolved through the design process and has been heavily influenced by the requirements of ensuring that flood risk is appropriately managed. The proposed layout recognises that the substation is located in a

region with a potential to be flooded. Through the design development the substation has evolved from a position of being located within the 1% AEP floodplain and requiring land raising and associated floodplain compensation to the final proposals, where the main compound of, and access road to, the substation is located out with the 1% AEP floodplain.

3 Site Description

3.1 Existing Site

The proposed site is located ~3.5km to the south of junction 14 of the M1 motorway, with access to the site being provided from the B106, Trewmount Road, ~2km north of Moy.

A significant part of the site is located adjacent to the floodplain of the Rivers Rhone & Blackwater. The River Rhone is located to the north of the site and flows from northwest to south east to a confluence with the River Blackwater, which is located to the east of the site and flows from southwest to northeast. Part of the proposed development application boundary has been identified as being located within the 1% Annual Exceedence Probability (AEP) floodplain, that which is considered to flood with a return period of 100 years.

The site use is currently agricultural land, primarily used for grazing.

The main part of the site comprises of a relatively steep slope with ground levels at the west of the site reaching ~34m AOD and falling to the east to the lowest part of the site at ~16.7m AOD. The area of the site to the north, from the main compound to the B106 is located on land between ~24m AOD and ~15.0m AOD.

The B106 at the northern boundary of the site is constructed on a locally raised embankment where it crosses the River Rhone floodplain. At the entrance to the site the road is at ~16m AOD, rising to the west and falling towards the River Rhone. At the River Rhone the road crosses the river on a box culvert with the road level at ~17m AOD.

Downstream of this bridge the River Rhone flows under Clonteevy Bridge to the River Blackwater, ~1.5km to the east of the site. The bridge is formed from two circular culverts. The River Blackwater flows in a north easterly direction to drain to Lough Neagh ~10km to the north.

A plan of the existing site and surrounding features is shown on **Figure 3.1, Appendix A.**

3.2 Proposed Development

The proposed development for the Turleenan Substation is to provide a connection to the existing 275kV electricity grid, to increase the voltage to 450kV and then connect to a new overhead power line to connect to the electricity grid in Eire.

This FRA is concerned with the flood risk associated with the development of the substation site and has not considered flood risks associated with elements of the connection route.

Sections of the proposed interconnector route cross or are adjacent to areas with a 1% EAP flood level. Where towers are located within existing flood plains the detailed design of the foundations and bases will take account of flood risk.

3.2.1 Substation Compound

The substation will comprise of the construction of a large relatively flat compound, with a total area of ~5ha, to accommodate a range of substation electrical equipment. This platform will be achieved by undertaking a significant excavation into the hillside, to provide a finished level for the platform of 17.75m AOD. No land raising will be carried out in the floodplain and no compensation storage to therefore required.

3.2.2 Access Road

An access road from the north of the compound will follow the contour of the hill to meet the B106 to the north of the site. The access road will be constructed at a level above the 1% AEP flood level to ensure that access to the site is maintained during flood conditions.

A temporary access from the new access road to the B106 will be formed during the construction phase of the compound, which will be located to the east of the permanent access and located within a small area of the 1% AEP floodplain.

A plan of the proposed substation and access route is shown on **Figure 3.2, Appendix A.**

4 Flood Risk Assessment

4.1 Existing Flood Risk

4.1.1

Flooding from Rivers

Consultation with the Rivers Agency has been carried out during the site selection and design for the substation. The Rivers Agency have provided guidance and information on appropriate design flood levels for the sites that have been considered and also made hydraulic modelling data of the River Rhone available to assist in carrying out this FRA.

The Rivers Agency have recommended that the appropriate level of risk for future development is the Q100 event, that with a 100 year return period. This is more appropriately referred to as the 1% Annual Exceedence Probability (AEP) event, i.e. there is a 1% probability that this level will be exceeded in any given year. An additional 'freeboard' allowance of 600mm, to accommodate climate change and uncertainties, should be added for design purposes.

Rivers Agency Flood mapping¹ for the area indicates that part of site within the application boundary includes land identified as the 1% AEP floodplain.

Early correspondence with the Rivers Agency confirmed that the appropriate 1% AEP flood level for the Turleenan substation is 16.01m AOD. However, subsequent evaluation of the available model data, including a hydrological review of the modelled flows, has concluded that the flood levels for the site are higher than those previously stated, as shown in **Table 4.1**.

Table 4.1 – Flood Levels for the River Rhone

AEP event (Return Period)	Upstream Flood Level – B106 Road Bridge (m AOD)	Downstream Flood Level – Clonteevy Road Bridge (m AOD)
10% (10)	16.39	16.09
4% (25)	16.49	16.10
2% (50)	16.56	16.12
1% (100)	16.61	16.13
0.5% (200)	16.75	16.15

The extent of existing flooding from the 1% AEP event is show on **Figure 4.1, Appendix A**.

The proposed level for the main compound of the development will be constructed at 17.75m AOD. Therefore, allowing a freeboard of 600mm added to the design flood levels, the site is considered to be at a sufficient level where the risk of flooding from the River Rhone will be substantially less than 1% AEP.

Freeboard allowances not only account for modelling uncertainties, but also include a provision for the effects of fast flowing water. As this is considered not to be present adjacent to this site, it is considered that there will be a further additional element of protection afforded to the site.

Further details of the hydrology and hydraulic modelling of the River Rhone are included in **Appendix B**.

¹ <http://www.riversagency.gov.uk/index/stategic-flood-maps.htm>

- 4.1.2** *Flooding from the Sea*
Due to the location and topographical properties of the site, it is not at risk of flooding from the sea.
- 4.1.3** *Flooding from Groundwater*
The geotechnical investigation for the site, undertaken during August and September 2006 reports that groundwater is likely to be encountered during the excavation works for the site, with artesian conditions present.
- It is considered that due to the nature of the site and the proposed excavation, there may be a risk of overland flows occurring from groundwater within the northern and western parts of the site. It is considered that this may result in relatively high flows during construction, which should reduce with time, although there may be some permanent seepage within the excavation.
- Any occurrence of groundwater should be manageable as part of the construction process by a competent contractor.
- 4.1.4** *Flooding from Land*
The site of the substation compound lies downhill from a small area of land, which could generate surface water run-on to the site in the event of extreme rainfall. It is considered that the rate of runoff will not be significant due to the small area upslope and that appropriate perimeter drainage will convey runoff around the compound.
- This drainage will also be required to manage any groundwater resulting from the excavation into the hill side.
- A Surface Water Management Strategy (SWMS) is included in **Appendix B**, with details of the conceptual drainage design shown on **Figure 4.2, Appendix C**.
- 4.1.5** *Flooding from Sewers*
There are no sewers or additional drainage systems that are considered to present a flood risk to the proposed site.
- 4.1.6** *Flooding from Canals, Reservoirs and Other Artificial Sources*
There are no man-made or artificial features within proximity to the development that can be considered to present a flood risk to the site.
- There are a number of local land drains and features which drain to the River Blackwater, located downstream of the site. Many of these drains are controlled by check valves; however, any failure of these drainage systems will not present a flood risk to the proposed development.
- 4.1.7** *Existing Flood Defence Structures*
There are a number of embankments located adjacent to the River Rhone, which have historically been formed from material arising from dredging of the watercourses. These embankments are recognised as informal flood defences, but have not been designed as such and are not considered to provide any formal protection to the site. Whilst these embankments provide some degree of protection to flood flows within the channels, modelling of the River Rhone shows that the embankments only provide protection for events up to 50% AEP. With a probability less than 50% AEP, the embankments are overtopped and do not provide any increased level of protection to the site.
- 4.2** **Future Flood Risk**
- 4.2.1** *Loss of Floodplain Storage*
There will be a temporary loss of floodplain storage as a result of the construction of the temporary access from the B106. This volume is considered to be not significant in respect to the effect that it will have upon the floodplain of the River Rhone or River Blackwater.
- 4.2.2** *Increased Runoff*
The flood risks associated with external influences on the site are not expected to be significantly increased. However, due to the changes in land use from the development there may be increased flood risk within and also downstream of the site as a result of the increased surface water runoff. Uncontrolled drainage from the development will increase the rates and volumes of runoff and has potential to increase flood risk. To prevent an unacceptable increase

in flood risk a SWMS has been developed to determine the requirements of the surface water drainage design.

Through the implementation of Sustainable Drainage Systems (SuDS) the rate of runoff can be controlled to ensure that runoff is not increased. SuDS can also provide additional environmental benefits to the development.

Further details of the SWMS are included in **Appendix B**, with details of the conceptual drainage design shown on **Figure 4.2, Appendix C**.

4.2.3

Access

The planning and design of the substation recognises that the probability of flooding on the surrounding public roads is higher than that for the substation and associated private access road.

This may lead to restrictions in gaining access to the site during extreme flood events. Therefore, it is considered that alternative transport arrangements may need to be available to provide access to the locality due to the potential for major traffic disruption during such extreme conditions.

Due to the probability of flooding to the surrounding land and public roads, an access/egress plan should be included within the management plan for the substation to ensure that alternative arrangements are allowed for in the event of flooding.

5 Conclusions

- 5.1 Flooding**
- A Flood Risk Assessment (FRA) has been carried out following the guidance and requirements set out in PPS15 and consultation with the Rivers Agency and the Northern Ireland Planning Service.
- Although the development boundary includes land recognised as being in the 1% AEP floodplain, no development will be taking place within the floodplain with this area being utilised for drainage, landscaping and mitigation planting.
- The development can be considered to be of regional importance and consists of essential infrastructure that has an operation requirement to be at this location.
- Alternative locations and site layout have been considered to minimise flood risk and the site is being proposed to be constructed at an elevation where the risk of flooding will be substantially less than 1% AEP.
- During the construction period of the substation the temporary alignment of the access road will encroach onto the floodplain, however, this is not considered to be significant, is temporary in nature and may be offset by providing temporary floodplain storage if considered necessary.
- The risks of flooding associated with groundwater flooding is considered to be significant during construction, however, with appropriate drainage design to accommodate additional groundwater flows the risk can be mitigated to ensure that the residual risk is acceptable. This risk should be managed within the method statements for the construction of the compound.
- Also, as a result of the development there is potential for incrementally modifying the flood risk downstream of the site, by increasing the surface water runoff due to the construction of impermeable areas. The measures required to mitigate the increase in surface water runoff have been developed through a SWMS.
- 5.2 Drainage**
- Drainage for the proposed development is proposed to include SuDS, which will provide attenuation and treatment to the increased surface water runoff that will occur as a result of the increased impermeable area of the development.
- The development has been assessed with source and site controls to develop an outline strategy. The runoff from the future development will be controlled and limited to ensure that it does not exceed the runoff from the existing undeveloped site. The assessment has been carried out for all rainfall events up to and including the 1% AEP event, including an allowance for future climate change of a 20% increase in rainfall intensity.
- A SWMS has been developed to assess the requirements of SuDS to mitigate the effects of the development on the increased surface water runoff and also to provide adequate treatment.

6 Recommendations

Whilst the proposed development is considered to have an annual probability of flooding substantially less than 1% from fluvial sources, it should be recognised that there remains a residual risk that can be further mitigated through appropriate design. This will ensure that operation of the substation will not be affected except under the most extreme circumstances.

Prior to construction the specific details of the drainage design and SuDS requirements should be developed, along with the overall development proposals, at the detailed design stage. The SuDS selections can be developed to provide increased source control where practicable; however, the detailed strategy will need to meet the requirements of the conceptual strategy as set out within this assessment.

Due to the size of the development and required earthworks, infiltration is considered to be appropriate; however, this should be confirmed if suitable ground conditions are encountered. Infiltration of runoff will require specific site testing but will lead to a better replication of the natural hydrological cycle, a reduction in the volume of attenuation storage required within the site and, potentially an overall reduction in runoff and hence, flood risk, from that presented by the current site.

The design of the SuDS elements should take into account the guidance included within the relevant documents including CIRIA reports C697, and C698.

7 Technical References

- The Planning Service – *Planning Policy Statement 15 (PPS15) Planning and Flood Risk*;
- Institute of Hydrology (1999): *The Flood Estimation Handbook*;
- Institute of Hydrology (1994) Report 124: *Flood Estimation of Small Catchments*;
- CIRIA (2004) C624 – *Development and Flood Risk – guidance for the Construction Industry*;
- CIRIA (2007) C697 - *The SUDS Manual*;
- CIRIA (2007) C698 - *Site handbook on the construction of SUDS*;
- CIRIA (1996) Report 156 - *Infiltration drainage: Manual of good practice*;
- Institute of Hydrology (1975): *Flood Studies Report*;

Appendix A – Figures

- **Figure 2.1** - Potential Substation Sites
- **Figure 3.1** - Existing site plan and features
- **Figure 3.2** - Proposed Development Plan
- **Figure 4.1** - Existing 1% AEP Flood Extents
- **Figure 4.2** - Conceptual Surface Water Drainage System

Appendix B – Fluvial Flood Risk

B.1 Hydrology

A hydrological assessment for the River Rhone has been carried out as part of this assessment and the results compared with the flows that were provided within the Rivers Agency model. There were some small differences between the two sets of data, which are considered to be normal within tolerances of hydrological assessments and are considered to be primarily based on different version of data used from the Flood Estimation Handbook.

In addition flow estimation for the River Blackwater has also been carried out.

River Rhone

The peak flows for the River Rhone have been estimated at a location just downstream of Clonteevy Bridge (IH 86350 58550) for a target event of 0.5% AEP. The estimation of peak flows was carried out using the FEH Statistical method, which estimates the peak flow discharges for specified return periods with respect to observed or transferred data.

The FEH statistical method involves the estimation of

- QMED, the meSWMSn annual maximum flood calculated from either the subject site or a donor site and catchment descriptors,
- Growth Curve(X_T), pooled from a group of hydrologically similar catchments
- Q_T , the flood magnitude, where T denotes the return period in years, calculated from the product of QMED and flood growth curves.

QMED: QMED is derived directly when there is a record of gauged floods of sufficient duration and quality close to the subject site. For an ungauged subject site, QMED can be estimated directly from the catchment descriptors or by data transfer from donor or analogue catchments.

Growth Curve, X_T : Pooling group analysis as prescribed by FEH is required for the majority of gauged sites in the UK due to the relatively short duration of gauged records, with pooling group analysis essential for ungauged sites. The number of pooled gauging stations collectively should supply five times as many years of record as the target return period. An appropriate statistical curve is then fitted to the pooled gauge data to generate the pooled growth curve for the subject site.

Flood magnitude Q_T : The flood magnitude Q_T is then calculated by the product of QMED and growth factor, X_T .

The QMED for the River Rhone, estimated by data transfer from donor catchments, is $10.26\text{m}^3/\text{s}$ while the QMED derived directly from the catchment descriptors is $11.54\text{m}^3/\text{s}$

The Growth curve factor along with the peak flow estimated for different return period is shown in **Table B.1**.

Table B.1 - Peak flows for the River Rhone

Return Period (year)	Growth curve factor (XT)	Peak flow (m ³ /sec)	
		Using Data transfer from Donor catchment	Using Data from catchment descriptor
50	2.255	23.15	26.01
100	2.564	26.32	29.57
200	2.902	29.79	33.48
500	3.401	34.91	39.24
1000	3.824	39.26	44.12

River Blackwater

The peak flow estimation for the River Blackwater was also carried using the FEH Statistical method. The peak flows were estimated immediately downstream of Emels Bridge (IH 88200 61200)

The QMED for the River Blackwater, estimated by data transfer from donor catchments, is 131.91m³/s while the QMED derived directly from the catchment descriptors is 274.47m³/s.

The Growth curve factor along with the peak flow estimated for different return period is shown in **Table B.2**.

Table B.2 - Peak flows for River Blackwater

Return Period (year)	Growth curve factor (XT)	Peak flow (m ³ /sec)	
		Using Data transfer from Donor catchment	Using Data from catchment descriptor
50	1.874	247.23	514.41
100	2.039	268.93	559.55
200	2.200	290.19	603.80
500	2.410	317.88	661.41
1000	2.560	337.69	702.63

B.2 Hydraulic Modelling

A Hec-Ras 1D steady state model of the River Rhone was made available by the Rivers Agency for this assessment. This model has been reviewed and the hydrological inputs amended to reflect the hydrological assessment outlined above. The extents and nature of the geometrical information used within the model have been reviewed and considered appropriate for the assessment.

The model has been used to simulate flood levels adjacent to the site, which are presented in **Table B.3**.

Table B.3 – Flood Levels for the River Rhone

AEP event (Return Period)	Upstream Flood Level - B106 Road Bridge (m AOD)	Downstream Flood Level – Clonteevy Road Bridge (m AOD)
10% (10)	16.39	16.09
4% (25)	16.49	16.10
2% (50)	16.56	16.12
1% (100)	16.61	16.13
0.5% (200)	16.75	16.15

Appendix C - Surface Water Management Strategy

C.1 Approach

The runoff from the site is proposed to incorporate Sustainable Drainage Systems (SuDS) to provide natural treatment and attenuation to runoff which, as a result of the development, will be increased in both volume and peak rates, due to the increased impermeable area.

To assess the impact of the development on the surface water runoff from the site, initial consultation has been undertaken with the Rivers Agency to determine the required level of attenuation.

C.1.1 Sustainable Drainage Systems (SuDS)

The opportunity to incorporate SuDS within the development has been identified and, where appropriate, the use of SuDS has been adopted. To help achieve the optimal use of SuDS, a management train approach has been undertaken to identify the most advantageous solution, according to site location, character and operational requirements. This procedure is presented in **Table C.1**.

Table C.1 Management Train Procedure

Management Train Stage	Considered in the design of	SuDS Selection
1. Prevention	Building layout.	The SuDS selection process included in CIRIA guide C697 has been used to help identify the most appropriate SuDS techniques for the different management train levels.
2. Source Control	Building and sub catchment layout.	
3. Site Control	Sub catchment/ Catchment layout.	
4. Regional Control	Catchment layout.	

SuDS techniques, which have been considered and adopted within the overall scheme design, have been selected from proven techniques/solutions that include the following:

- Permeable paving;
- Green roofs;
- Bio-retention;
- Filtration techniques;
- Grassed filter trips;
- Swales;
- Infiltration devices;
- Filter drains;
- Infiltration basin;
- Extended detention ponds;
- Wet ponds;
- Storm water wetlands; and

- On/ off line storage.

In order to produce a successful detailed SuDS solution, the amenity value of proposals and the quality and quantity of the surface water discharge need to be considered for each management train stage. This has been achieved by adopting the CIRIA guide C697 - *The SUDS manual* which uses a scoring system to evaluate the main aspects of surface water discharge by considering the following issues:

- Hydrological;
- Land use;
- Physical site features;
- Community and environment; and
- Economic and maintenance.

C.1.1.2 SuDS Selection

By assessing the site proposals, ground conditions, available land and required design criteria, the management train approach has identified that a range of options are applicable to the site.

C.2 Criteria

C.2.1 Attenuation

Following consultation, with the Rivers Agency and the requirements of PPS15, the drainage has been developed assuming that the runoff from the site will not be increased following development. Therefore, the discharge rates from the post developed site will be controlled to match those from the undeveloped site for all events up to and including the 1% Annual Exceedence Probability (AEP) events, equivalent to the 1 in 100 year events, including an appropriate allowance for future climate change.

C.2.2 Required Treatment Volume

The design treatment volume (V_t) is designed to capture 75 – 90% of the storms in a year. This ensures the smaller volumes of runoff are stored within the treatment systems and appropriately treated. The smaller volumes of runoff are those in which pollution is most concentrated, as the initial runoff from surfaces washes the pollutants into the surface water collection system.

The calculations of V_t are based on formulae and guidance published in CIRIA report C697 - *The SUDS Manual*

C.2.3 Climate Change

The SWMS has taken into consideration guidance in PPS15, which recommends that an allowance for a 20% increase in rainfall intensity is included, which is applicable to a design horizon to 2085.

C.3 Methodology

The proposed SuDS for the site have been developed by working through the following stages associated with developing a strategy and outline concept:

- Calculation of 'greenfield' or undeveloped runoff rates;
- Determination of a strategy to incorporate the selected elements of SuDS;
- Determination of treatment requirements for the site;
- Identification of sub-catchments;
- Modelling of individual elements within sub-catchments; and
- 'Cascading' elements together to provide a complete analysis of whole development site.

C.3.1 Existing Site Runoff

The existing site runoff has been estimated using the guidance from the Institute of Hydrology Report 124 (IoH124). The calculation is based upon the following factors:

C.3.1.1 Area

Catchment Area (ha), the area of the site has been set to 1ha to determine runoff rates per unit area.

C.3.1.2 SAAR

Average annual rainfall (1941-1970) from Figure II.3.1 of the Flood Studies Report (FSR) or equivalent, which is 875mm for this location.

C.3.1.3 Soil

Soil index of the catchment from FSR Figure I.4.18 or Wallingford Procedure Volume 3. Soil Types 1 to 5 have Soil Index Values of 0.15, 0.3, 0.4, 0.45 and 0.5 respectively. For the Turleenan Substation site, the soil is recorded as Type 1, with a Soil Index Value of 0.15, this is described as '(i) *Well drained permeable sandy or loamy soils and shallower analogues over highly permeable limestone, chalk, sandstone or related drifts; (ii) Earthy peat soils drained by dykes and pumps; or (iii) Less permeable loamy over clayey soils on plateaux adjacent to very permeable soils in valleys*'.

C.3.1.4 Urban

This is the value relevant to how developed the existing site is, taken as 0 for the Turleenan Substation site which is completely greenfield.

C.3.1.5 Region Number

The region number of the catchment, based on Figure I.2.4 of the Flood Studies Report, which is 11 for Ireland.

C.3.2 Rainfall

Design rainfall for the site has been derived from Flood Estimation Handbook (FEH) catchment data for the site. The Standard Annual Average Rainfall (SAAR) for the site is recorded as 875mm from the FSR, or 900mm from FEH. An allowance of 20% has been allowed for within the design to account for future increases in rainfall intensity as a result of expected climate change.

C.3.3 Topography

The site topography used within the development of the SWMS has been obtained from the site survey provided by Northern Ireland Electricity and is supplemented by regional LIDAR data.

C.4 Modelling

C.4.1 Approach

The modelling of the conceptual drainage system has been undertaken by calculating the access road and paved areas. The areas included within the model have been determined from the proposed development layout as shown on **Figure 4.2, Appendix A**.

The drainage strategy has been developed through hydrological modelling of the site using Micro Drainage's WinDes software. WinDes is recognised as leading software for carrying out analysis and design of drainage systems.

C.4.2 Discharge Controls

Each element is proposed to be controlled to maximise the local attenuation and treatment before overflowing to the next constituent component in the system. The controls have been designed to ensure that there will be no flooding within the site for rainfall events up to and including the future 1% event.

C.4.3 Simulations

The model of the proposed system has been analysed with a range of rainfall events. The events include those with the annual probability that is of particular interest, i.e. 1% and 3.33%, and for a range of durations from 15 minutes up to 10080 minutes, or 7 days. This is checked to ensure that the critical duration event is included within the analysis. The simulations also include the appropriate allowance for climate change.

C.5 Results

C.5.1 Existing Site Runoff

The runoff from the overall existing site has been calculated using the methodology outlined in Section C.3.1 and the results are summarised in **Table C.2** below.

Table C.2 Undeveloped (Greenfield) Site Runoff

Return Period	Runoff (l/s/ha)
1	0.45
2	0.50
5	0.63
10	0.71
20	0.79
25	0.81
30	0.84
50	0.89
100	0.97

C.5.2 Treatment Volume, V_t

The design treatment volume, V_t , has been calculated from the following formula and will be drained from the structure over a 24 hour period²:

$$V_t (m^3 / ha) = 9 \times M5 - 60 \times \left(\frac{SOIL}{2} + \left(1 - \frac{SOIL}{2} \right) \times I \right)$$

For the Turleenan substation site:

The statistical 5 year 60 minute rainfall event, M5-60, is predicted to be 16.8mm

SOIL = 0.15

I, impervious area = 0.23, assuming that the development area draining to the SuDS is 23% impermeable, reflecting that large areas of the substation compound will be formed from gravel.

Therefore:

$$V_t (m^3 / ha) = 9 \times 16.8 \times \left(\frac{0.15}{2} + \left(1 - \frac{0.15}{2} \right) \times 0.23 \right) = 43.5 m^3 / ha$$

The V_t for the catchment has been calculated and treatment is proposed to be provided within a wetland to the south of the main compound.

C.5.3 Proposed SuDS

A conceptual SuDS has been developed to demonstrate that onsite drainage can mitigate the effects of the development in providing attenuation to the increased runoff. The SuDS will also provide treatment to the additional runoff, to prevent any deterioration in surface water quality.

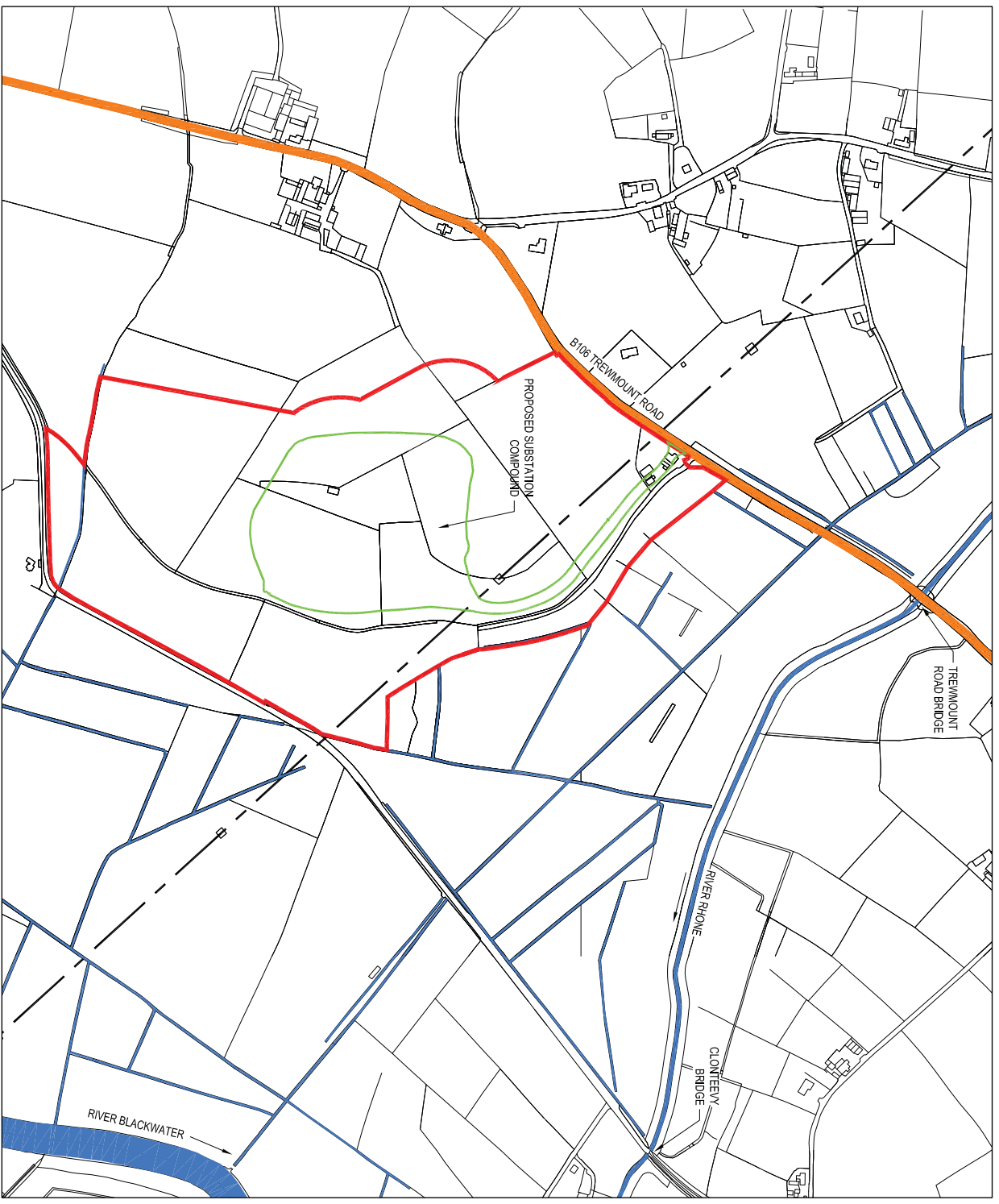
The proposed SuDS arrangement, shown on **Figure 4.2, Appendix A** includes drainage to mitigate the groundwater flood risk, a series of filtration trenches to drain and attenuate surface water runoff, prior to discharges draining through a wetland to receive treatment.

C.5.3 SuDS Performance

The proposed scheme has been modelled within the Microdrainage WinDes software.

The overall surface water attenuation requirements for the site are ~ 220m³, which can be incorporated into the proposed development utilising a variety of SuDS methods.

² CIRIA 697 'The SuDS manual'

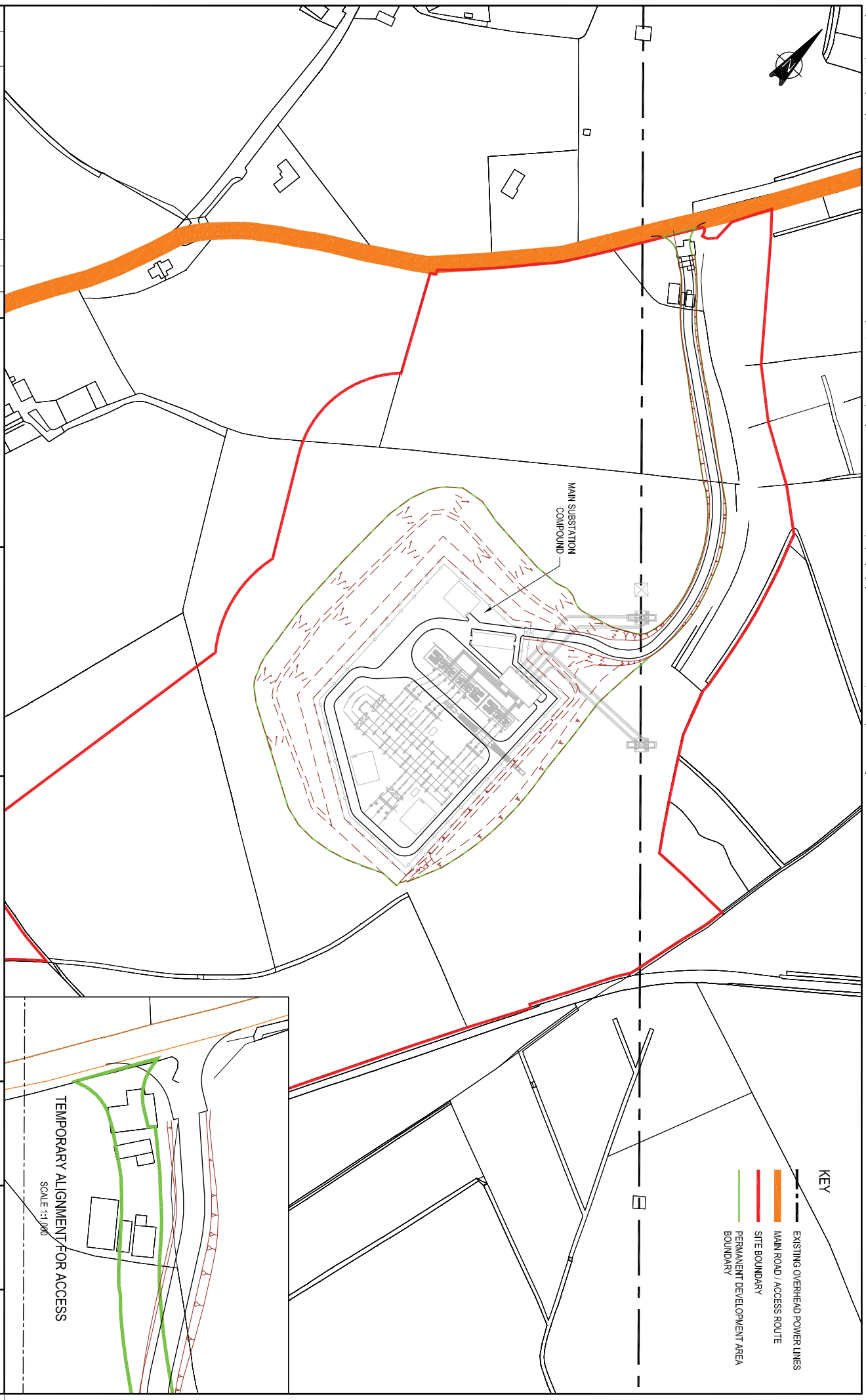


KEY

- EXISTING OVERHEAD POWER LINES
- EXISTING LAND DRAINAGE DITCHES & WATER FEATURES
- MAIN ROAD / ACCESS ROUTE
- SITE BOUNDARY
- PERMANENT DEVELOPMENT AREA BOUNDARY

Rev	Date	Detail	Made	CHK'd	App'd	Client:	Title:		Project:		AECOM		Status :		No. 60032220 - FIGURE 3.1		Rev:	CM	
C	13/08/09	PERMANENT DEVELOPMENT AREA BOUNDARY ADDED	AN	PR	PR		EXISTING SITE & FEATURES		TURREENAN SUBSTATION FLOODRISK ASSESSMENT		Duneadh House, Ravelston Terrace, EDINBURGH, EH4 3TP		Eng :	PR	CAD :	AN	Scale :	1:5,000	C
B	26/07/09	ACCESS ROAD ALIGNMENT AMENDED	AN	PR	PR		AECOM		CHK'd :	PR	App'd :	PR	Date :	OCT '08					
A	12/06/09	SITE COMPOUND POSITION AMENDED	AN	PR	PR		Tel: +44 (0) 131 311 4000 Fax: +44 (0) 131 311 4090 www.aecom.com		AECOM										

This document has been prepared by Fisher Maunsell Limited ("FML") for the sole use of our Client (the "Client") and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between FML and the Client. Any information provided by third parties and referred to herein has not been checked or verified by FML, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of FML.

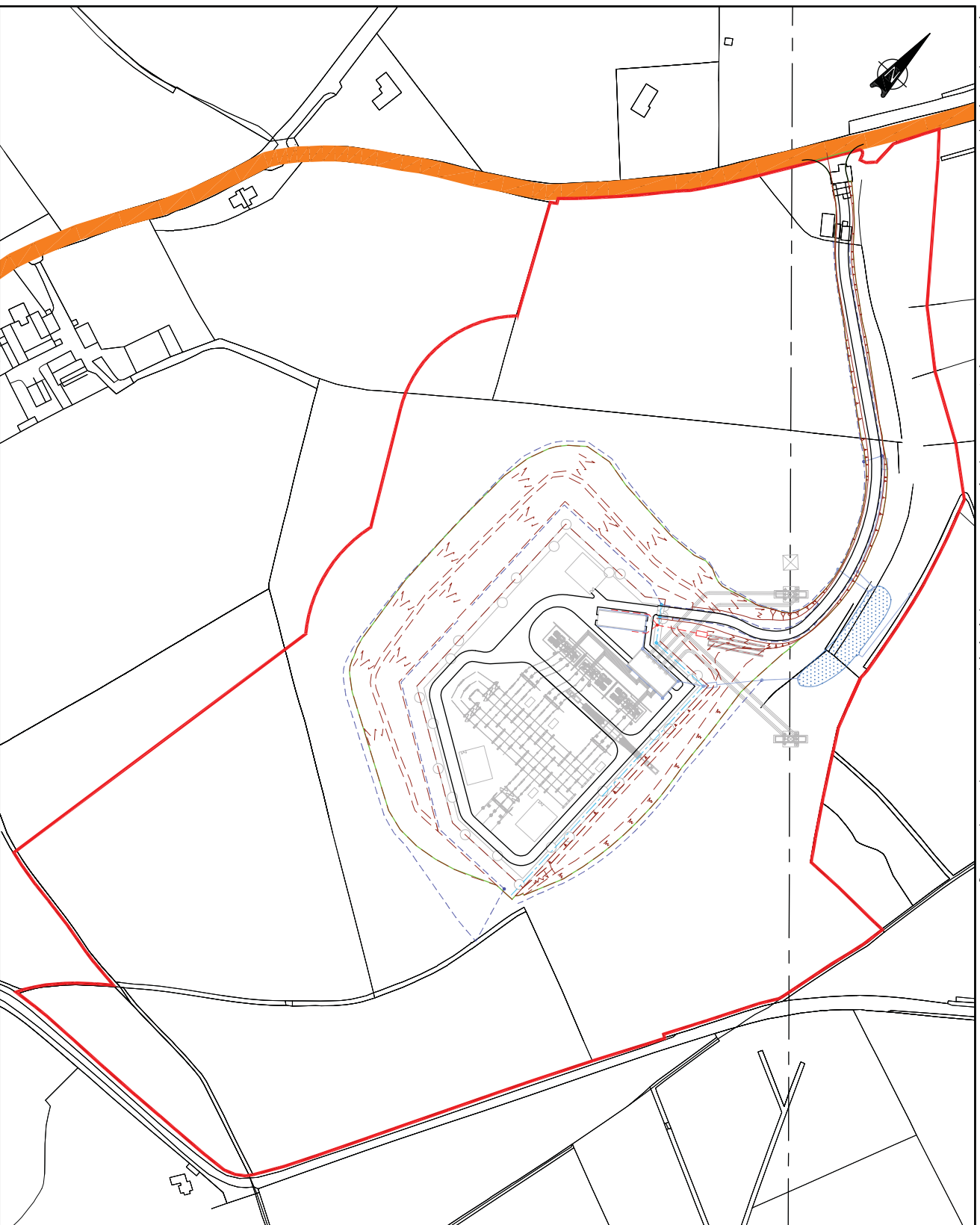


- KEY**
- EXISTING OVERHEAD POWER LINES
 - MAIN ROAD / ACCESS ROUTE
 - SITE BOUNDARY
 - PERMANENT DEVELOPMENT AREA BOUNDARY

TEMPORARY ALIGNMENT FOR ACCESS
SCALE 1:1,000

Rev	Date	Detail	Made	CHK'd	App'd	Client:	Title:		AECOM Dunedin House, Ravelston Terrace, EDINBURGH, EH4 3TP Tel: +44 (0) 131 311 4000 Fax: +44 (0) 131 311 4090 www.aecom.com		Eng :	PR	CAD :	AN	Scale :	1:2,500
C	13/08/09	PERMANENT DEVELOPMENT AREA BOUNDARY ADDED	AN	PR	PR	 Project: TURLLEENAN SUBSTATION FLOODRISK ASSESSMENT	PROPOSED DEVELOPMENT			CHK'd :	PR	App'd :	PR	Date :	OCT '08	
B	28/07/09	ACCESS ROAD ALIGNMENT AMENDED	AN	PR	PR		NO. 60032220 - FIGURE 3.2	Status :			Rev :	C				
A	12/06/09	SITE COMPOUND POSITION AMENDED	AN	PR	PR			CM					A3			

This document has been prepared by Fisher Maunsell Limited ("FMA") for the sole use of our Client (the "Client") and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between FMA and the Client. Any information provided by third parties and referred to herein has not been checked or verified by FMA, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of FMA.



KEY

- EXISTING OVERHEAD POWER LINES
- MAIN ROAD / ACCESS ROUTE
- SITE BOUNDARY
- PERMANENT DEVELOPMENT AREA BOUNDARY
- PROPOSED PERFORATED FIELD DRAIN
- PROPOSED HALF PERFORATED FILTER DRAIN
- PROPOSED UNPERFORATED FILTER DRAIN
- PROPOSED UPVC FOUL SEWER
- WETLAND

Rev	Date	Detail	Made	CHK'd	App'd
A	12/06/09	SITE COMPOUND POSITION AMENDED	AM	PR	PR
B	24/07/09	ACCESS ROAD ALIGNMENT & POND POSITION AMENDED	AM	PR	PR
C	13/08/09	PERMANENT DEVELOPMENT AREA BOUNDARY ADDED	AM	PR	PR

Client: 
 Project: **TURLEEMAN SUBSTATION FLOODRISK ASSESSMENT**

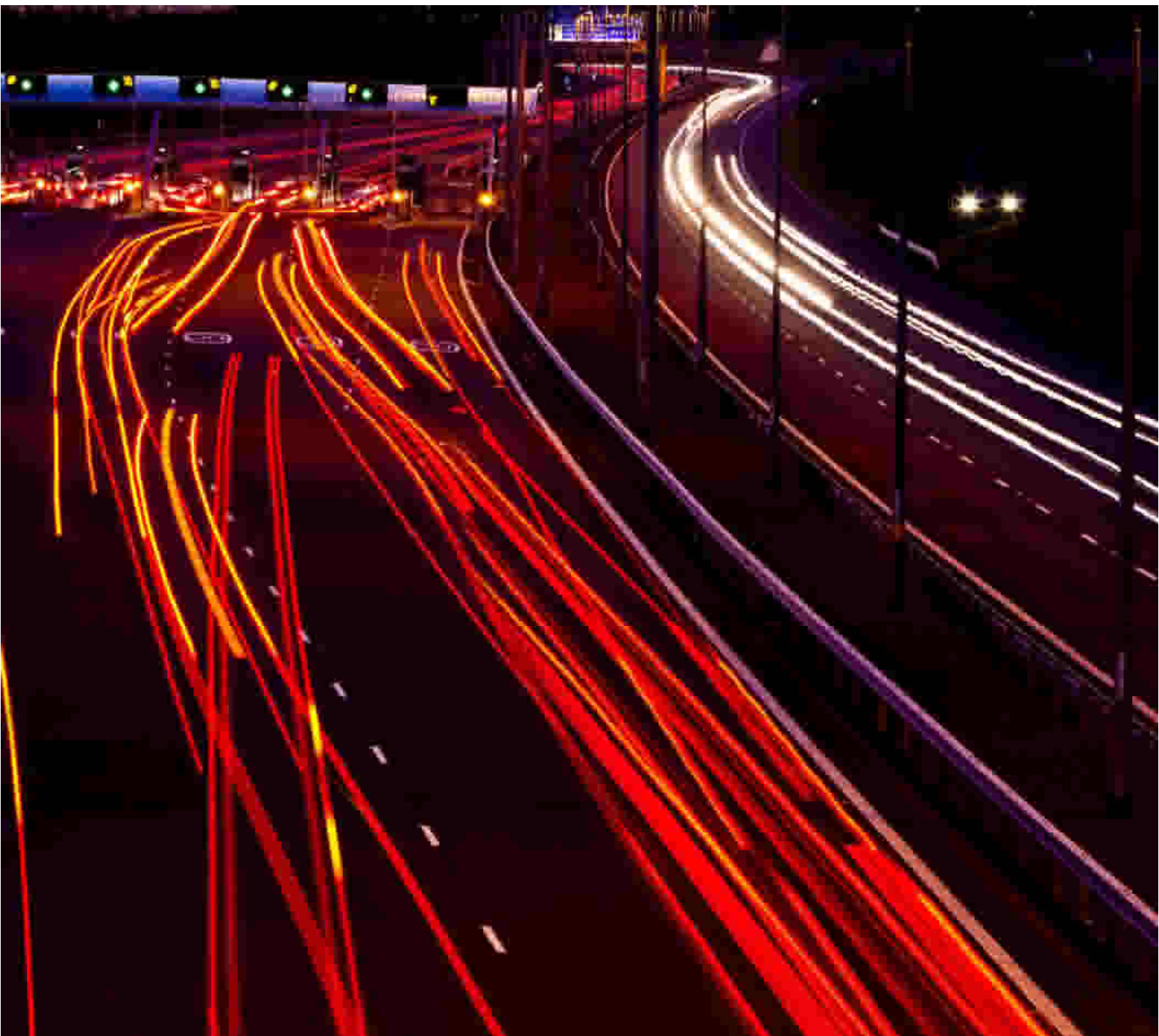
Title: **CONCEPTUAL SURFACE WATER DRAINAGE SYSTEM**

AECOM
 Duneedin House, Ravenston Terrace,
 EDINBURGH, EH4 3TP
 Tel: +44 (0) 131 311 4000
 Fax: +44 (0) 131 311 4090
 www.aecom.com


Eng:	PR	CAD:	AN	Scale:	1:2,500	
CHK'd:	PR	App'd:	PR	Date:	OCT '08	
Status:						
No.	60032220 - FIGURE 4.2				Rev:	C
CM						A3

Appendix 18A – Transport Assessment

Tyrone Cavan Interconnector - Transport Assessment



Prepared by: 
Emma Greenlees
Senior Consultant

Checked & Approved by: 
Tim Robinson
Regional Director

Tyrone Cavan Interconnector - Transport Assessment

Rev No	Comments	Checked by	Approved by	Date
	Final Issue	TJR	TJR	22.05.13

Telephone: 028 9060 7200 Website: <http://www.aecom.com>

Job No 60032220

Reference Transport Assessment

Date Created May 2013

This document is confidential and the copyright of AECOM Limited. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Structure of Report	1
1.3	Site Location	1
1.4	Policy Context.....	2
1.4.1	Planning Policy Statement 3 : Access, Movement and Parking.....	2
1.4.2	Planning Policy Statement 13 : Transportation and Landuse	2
1.4.3	Development Control Advice Note 15 : Vehicular Access Standards	3
1.4.4	Transport Assessment Guidelines for Development Proposals in Northern Ireland	3
1.4.5	DMRB TD42/95 Geometric Design of Major/Minor Priority Junctions.....	3
1.4.6	DMRB TD 41/95 Vehicular Access to All-Purpose Trunk Roads	3
1.4.7	Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations ..3	
2	Assessing the Travel Characteristics of the Site	5
2.1	Introduction.....	5
2.2	Development Proposals.....	5
2.2.1	Turleenan Substation.....	5
2.2.2	Overhead Line and Towers	5
2.3	Depot and Supplier Details	6
2.4	Accessibility of the Development Site	6
2.4.1	Site Visits.....	6
2.4.2	Existing Road Network	7
2.4.3	Traffic Management.....	8
2.4.4	Baseline Traffic Conditions	10
2.5	Estimating the Travel Generated and Modal Split.....	12
2.5.1	Turleenan Substation.....	12
2.6	Overhead Lines and Towers Traffic Generation	13
3	Influencing Travel to the Proposed Development.....	18
3.2	Location	18
3.3	Scale.....	18
3.4	Layout and Design of the Development.....	18
3.5	Promoting Access on Foot.....	18
3.6	Promoting Access on Bicycle	18
3.7	Promoting Public Transport Access.....	19
3.8	Managing Car Use and Parking.....	19
3.8.1	Traffic Management.....	19
3.8.2	Parking	19
3.8.3	Traffic Impacts	19
3.9	Committed Developments	19
3.10	Summary	20
4	Appraising and Mitigating Impact.....	22
4.1	Introduction.....	22
4.2	Accessibility and Integration Impacts with the Local Community	22
4.2.1	Access to Public Transport System	22
4.2.2	Access to Local Area	22
4.2.3	Community Severance	22
4.2.4	Integration.....	22
4.3	Safety and Security Impacts	22
4.4	Environmental Impacts	24
4.5	Highway and Traffic Impacts	24
4.5.1	Haul Routes.....	24
4.6	Construction Management.....	24
4.7	Calculation of Traffic Impacts	24

4.7.1	Development Traffic.....	24
4.7.2	Forecast Background Traffic.....	24
4.8	Detailed Traffic Assessment.....	27
4.8.1	Congestion Reference Flows.....	27
4.8.2	Traffic Flow Implications from First Principles.....	29
4.8.3	Consideration of Impact on Road Pavements and Below Pavement Infrastructure.....	31
4.8.4	Impacts at Temporary Accesses to Towers.....	31
4.8.5	Summary.....	33
4.9	Mitigation.....	33
4.9.1	Turleenan Substation.....	33
4.9.2	Overhead Line and Towers.....	34
4.10	Parking.....	36
4.11	Road Pavements and Below Pavement Infrastructure.....	36
4.11.1	Overview.....	37
4.11.2	Baseline Assessment.....	37
4.11.3	Prevention of Damage to the Public Highway.....	37
4.11.4	Repairs to Damage to Roadways.....	37
4.12	Construction Traffic Management Plan.....	37
4.13	Conclusions.....	38
4.13.1	Turleenan Substation.....	38
4.13.2	Overhead Line and Towers.....	38
5	Summary and Conclusions.....	41
5.1	Key Points.....	41

- Annex 1 – Overhead Line and Towers Access Summary
- Annex 2 - Determination of Peak Hour Calculations
- Annex 3 - Overhead Lines and Towers Traffic Generation
- Annex 4 - Overhead Lines and Towers Traffic Impacts
- Annex 5 - Technical Note on Sightline Requirements for Turleenan Substation Accesses
- Annex 6 – CRF Calculations
- Annex 7 - 12 Hour Traffic Profiles for Roads with more than 10% Traffic Impacts
- Annex 8 – Haul Routes
- Annex 9 – Overhead Line and Towers Access Assessment & AutoTracks of Accesses Requiring No Mitigation
- Annex 10 – Proposed Mitigation/Enhancement Measures
- Annex 11 - Construction Traffic Management Plan

- Figure 1 – Development Location
- Figure 2 – Turleenan Substation Temporary Access
- Figure 3 – Turleenan Substation Permanent Access
- Figure 4 - Depot at Carn Industrial Estate Location
- Figure 5 - Location of AECOM ATC Surveys
- Figure 6 - Location of Roads Service Permanent Counters
- Figure 7 – 2008-2010 Collision History Within Study Area

1 Introduction

1 Introduction

1.1 Background

Northern Ireland Electricity (NIE) is seeking consent from the Northern Ireland Department of the Environment (DOE) for a 400,000 volt (400kV) overhead transmission line in Counties Tyrone and Armagh and an ancillary 275/400kV substation at Turleenan townland, near Moy, County Tyrone.

The scheme consists of three elements:

- The construction of 102 towers and tower bases;
- The installation of approximately 34km of 400kV overhead line; and
- Associated substation at Turleenan (including 2 additional 275kV towers).

Under Schedule 1 Category 20 of the EIA regulations, the Proposed Development required an Environmental Impact Assessment (EIA). This was undertaken and an Environmental Statement (ES), produced in 2009, and Addenda, reported the findings of the EIA and thus informing the DOE, statutory consultees, the public and interested parties about the likely effects of the Proposed Development on the surrounding environment.

At a meeting with Roads Service and Planning Service on 10 January 2013, Roads Service requested that a separate Transport Assessment (TA) report be produced, with the salient points of the TA included as a chapter within the Environmental Statement. This Transport Assessment provides a detailed overview of the current transport issues within the area, the assessment of the proposed construction accesses and traffic impact assessment and identification of appropriate measures to minimise impacts.

1.2 Structure of Report

Taking account of the Planning Service document, 'Transport Assessment Guidelines for Development Proposals in Northern Ireland', published 9 November 2006, the Transport Assessment is to be undertaken in the following stages:

- 1) Assessing the Travel Characteristics of the Site (Section 2 of this TA);
- 2) Influencing Travel to the Proposed Development (Section 3); and
- 3) Appraising and Mitigating Impacts (Section 4).

These stages consider the following:

- Existing situation;
- Development Proposals;
- Forecast Traffic;
- Highway Impact;
- Road Safety;
- Parking Provision;
- Public Transport; and
- Pedestrians, Cyclists and People with Disabilities.

1.3 Site Location

The Proposed Development consists of a new substation outside Moy, County Tyrone, in the townland of Turleenan and the construction of approximately 34kms of 400kv overhead line circuit from the source substation to a border crossing between the townlands of Doohat or Crossreagh, County Armagh and Lemgare, County Monaghan, where it will tie into the future EirGrid network. The overhead line will continue on in the Republic of Ireland with all further towers to be proposed by EirGrid for placement within that jurisdiction. However, owing to geographic border definitions in the immediate area of the border crossing, there will be a 200m of line oversail in the Northern Ireland townland of Crossbane which forms part of the Proposed Development.

The location of the substation is permanent; however temporary access is required at over 100 locations in order to facilitate the construction of towers that will carry the overhead line.

For the purpose of this Transport Assessment the study area relates to the roads where temporary and permanent accesses are to be located and also haul routes that will be used for the transportation of construction and maintenance traffic. This consists of a mixture of A, B and C class roads, rural roads and unclassified roads.

The A Class roads in the locality are: the A28 which runs between Augher, Aughnacloy, and Armagh; the A29 which runs between Dungannon, Moy, Armagh and Newtownhamilton; and the A3 which runs between Armagh and the border near Monaghan.

The B Class roads in the locality are; the B3 which runs from Tandragee to the border; the B115 which runs between Armagh and the B45; the B106 which runs between Benburb, Moy and the M1; the B128 which runs between Blackwatertown, Benburb and Aughnacloy; and the B132 which runs from Keady to the A3.

The only C class road in the study area is Derrynoose Road which is a good quality road providing connection between the B3 and the L3530 across the border (near Coolartragh).

The majority of roads within the locality are unclassified rural roads. The unclassified roads range in width and traffic flow, with some just providing a 'spur' off the adjoining road for access to the houses located along it.

Figure 1 highlights the Proposed Development within the context of the surrounding road network.

1.4 Policy Context

For the purposes of this Transport Assessment a number of planning advice and documents have been referred to and these include:

- Planning Policy Statement 3 (PPS 3) : Access, Movement and Parking, Department of the Environment Planning Service, February 2005 and Clarification of Policy AMP3: Access to Protected Routes, October 2006;
- Planning Policy Statement 13 (PPS 13) : Transportation and Landuse, Department of Regional Development, 2005;
- Development Control Advice Note 15 (DCAN 15) : Vehicular Access Standards, Department of the Environment Planning Service & Roads Service Development Control, August 1999;
- Transport Assessment Guidelines for Development Proposals in Northern Ireland, Department of Regional Development & Department of the Environment, 9 November 2006;
- The Design Manual for Roads and Bridges (DMRB) TD42/95 Geometric Design of Major/Minor Priority Junctions; and
- DMRB TD 41/95 Vehicular Access to All-Purpose Trunk Roads.

1.4.1 Planning Policy Statement 3 : Access, Movement and Parking

PPS 3 sets out the Departments planning policies for vehicular and pedestrian access, transport assessment, the protection of transport routes and parking. It forms an important element in the integration of land use planning. It embodies the Government's commitments to the provision of a modern, safe and sustainable transport system, the improvement of mobility for those who are socially excluded or whose mobility is impaired, the promotion of healthier living and improved road safety.

1.4.2 Planning Policy Statement 13 : Transportation and Landuse

The Department for Regional Development (DRD) formulated Shaping our Future: the Regional Development Strategy for Northern Ireland 2025 (RDS) in September 2001. Planning Policy Statement 13 has been prepared to assist in the implementation of the RDS. It will guide the integration of transportation and land use, particularly through the preparation of development plans and transport plans. PPS 13 replaces Strategic Policy 11 and Policy PSU 6 of "A Planning strategy for Rural Northern Ireland". PPS13 flows directly from the vision, spatial strategy and strategic planning guidelines contained in the RDS.

1.4.3 Development Control Advice Note 15 : Vehicular Access Standards

Development Control Advice Note 15 (DCAN 15) sets out the advice relating to vehicular accesses. That advice set out in DCAN 15 applies to new private accesses and new development access roads joining the public road.

1.4.4 Transport Assessment Guidelines for Development Proposals in Northern Ireland

These guidelines assist in the preparation of Transport Assessments for development proposals in Northern Ireland, the policy context for which is set out in Planning Policy Statement 13: Transportation and Land Use and Planning Policy Statement 3: Access, Movement and Parking.

The purpose of Transport Assessment is to provide enough information for DoE and DRD to understand how the Proposed Development is likely to function in transport terms. Assessing the transport impacts in a systematic manner contributes towards understanding how more sustainable travel patterns might be achieved through changing travel behaviour. Transport Assessment also subsumes the former process of Traffic Impact Assessment.

1.4.5 DMRB TD42/95 Geometric Design of Major/Minor Priority Junctions

This document advises on the design of major/minor priority junction, including the siting of such junctions. Recommendations are given on the geometric design of the important elements of the major/minor priority junction, and the way in which the individual components can be brought together to produce a good overall design

1.4.6 DMRB TD 41/95 Vehicular Access to All-Purpose Trunk Roads

This document sets out standards for the geometric layout of connections for direct vehicular access to all-purpose trunk roads where the numbers using the connection are below 500 AADT. The Standard describes the effects of vehicular access to Trunk Roads and outlines the results of recent research on the safety implication.

1.4.7 Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations

Chapter 8 of the Manual sets out the effects of road works or temporary closures on all kinds of road user and recommends steps that should be taken to minimise these effects.

2 Assessing the Travel Characteristics of the Site

2 Assessing the Travel Characteristics of the Site

2.1 Introduction

This section of the Transport Assessment provides a description of how the transport aspects of the Proposed Development will function, including:

- Development proposals;
- Accessibility of the site; and,
- Estimation of the travel generated and the likely modal split.

2.2 Development Proposals

The development proposals to be assessed in this report, relate to two aspects. Firstly, the construction of a substation at Turleenan (which includes the removal of one existing 275kV tower and replacement with two new 275kV towers). This is a permanent development with a permanent access. Secondly the construction of the overhead line and towers. Whilst the towers and overhead line are permanent features their access requirements for the purposes of construction are temporary.

2.2.1 Turleenan Substation

The substation will consist of two buildings, a control building and a Gas Insulated Switchgear (GIS) building and an open air 400kV switchyard (AIS). The positioning of the proposed substation compound has been aligned with NIE's existing 275kV overhead line and will allow connection to the proposed 400kV overhead line. The development will require one existing 275kV intermediate suspension tower in the vicinity of the substation to be removed and two new 275kV towers to be constructed to provide connection to the proposed substation.

The proposed substation is located in the Turleenan townland, near Moy, County Tyrone with access via Trewmount Road (B106), as shown in Figure 1.

Construction of the substation is estimated to take a period of three years, with a start date of 2015 and completion in 2017. Once completed it will be maintained throughout its life and will become permanent as part of NIE's major infrastructure. The development includes a total of six car parking spaces to facilitate staff parking when maintenance is required.

There is an existing dwelling (No. 152 Trewmount Road) located within the confines of the development site. The development proposals involve initially allowing the dwelling to remain during the construction phase (to be used as a site office), with a temporary access located to the northern edge of the site, see Figure 2. It should be noted that this access is located within the flood plain and therefore it is intended, once the majority of the construction work is completed, to demolish the dwelling and locate the permanent access to the site in this location, which is not in the flood plain. Figure 3 shows the proposed permanent access location.

2.2.2 Overhead Line and Towers

The overhead line and towers will include a total of 102 towers. The spacing, type of tower and the height vary depending on technical requirements, which relate primarily to topography. An 'intermediate' tower is used where the line route is straight. 'Angle' towers are used to accommodate bends/turns in the line route. Three types of angle towers are required in the Proposed Development: a 30 degree angle tower, a 60 degree angle tower and a 90 degree angle tower. In total the development includes:

- 66 No. intermediate towers;
- 14 No. 30 degree towers;
- 18 No. 60 degree towers; and
- 4 No. 90 degree towers.

During construction, once a sufficient number of sequential sections are completed, stringing of the conductor line can commence. Stringing is undertaken from angle tower to angle tower. During the stringing process it is sometimes necessary to 'guard' over roads and/or rivers to be crossed so that the line does not hit the road or water.

A total of 104 temporary accesses are to be used to construct the 102 proposed towers. The vast majority of these temporary accesses will use either existing field gates or laneways.

Annex 1 details the proposed access arrangements to each of the towers and separate stringing locations, including photos of the proposed access locations.

2.3 Depot and Supplier Details

It is intended to use NIE's existing depot at Carn Industrial Estate, Craigavon, as the depot for the construction of the Proposed Development. The depot will be used to store construction vehicles and equipment. This includes all the steel required to build the towers. Materials for all of the construction phase (substation, overhead line and towers) will be stored at the existing NIE depot at Carn, Craigavon. Carn is NIE's main regional depot in the southern half of Northern Ireland, consisting of Regional Office, Main Stores for Distribution, and the Distribution Control Centre for all of Northern Ireland. It is adjacent to the M12 Carn roundabout and 15 miles (24km) from the proposed Turleenan Substation which will link the proposed new 400kV Line to the existing Network.

With regard to stone and concrete, which unlike other construction equipment stored at Carn will go directly from the source to the construction sites, will be sourced from suppliers through the contractor. Licensed landfill sites will be used to dispose of waste spoil from the construction. There are a number of landfill sites in the area that can be used to dispose of the waste and spoil material. These include for example Tullyvar Landfill Site, near Aughnacloy the Aughnagun Landfill Site near Mayobridge and the Lisbane Landfill Site near Tandragee.

These can all be immediately accessed via A and B routes. The Tullyvar site is to the north of the study area and can be accessed via the A29 and then onto the A4 and A5 routes. The Aughnagun Landfill Site is to the south of the study area and can be accessed via the A29 as far as Armagh and then the A28 to Newry and then on to the B6 and B7 on the eastern side of Newry. The Lisbane Landfill Site near Tandragee is to the east of the study area and is accessed via the A29 and A51.

For the purposes of this aspect of the Transport Assessment all these routes are suitable for the types and volumes of traffic generated by the Proposed Development.

2.4 Accessibility of the Development Site

Within this section of the Transport Assessment, accessibility of the development site by the different modes including walking and cycling, public transport and car access is normally considered (note there are two routes on the National Cycle Network routes 91 and 95 which run through the study area). However, due to the unique nature of the Proposed Development whereby almost the entirety of traffic generated by the development will be during the construction phase, vehicular access only has been considered. Construction workers will avail of minibus/works type vehicles to access the tower locations.

2.4.1 Site Visits

A number of site visits have been undertaken during 2012 and 2013 at different times of the year and involved driving the local road network in order to ascertain any issues in terms of access points, road conditions and general site locations. This included a series of road width measurements at the potential site access locations. It is noted that given the rural nature of the study area that accessibility by foot, cycle and public transport is limited. Annex 1 shows a sample of the locations visited.

2.4.2 Existing Road Network

The study area covers approximately 34km of road network between the Tyrone and Cavan county border as illustrated in Figure 1. This consists of a mixture of A and B class roads, and C Class and Unclassified Roads(C/UC).

2.4.2.1 A Class Roads

The A Class roads in the locality are:

- A26 Killylea Road – runs between Armagh and Caledon;
- A29 Moy Road - runs between Dungannon, Moy, Armagh and Newtownhamilton; and
- A3 Monaghan Road - runs between Armagh and the border near Monaghan.

The above roads have central delineating white lines, have high speeds and relatively high traffic flows.

2.4.2.2 B Class Roads

The B Class roads in the locality are:

- B3 Fergort Road - runs from Keady o the border;
- B115 Battleford Road - runs between Eglish and Armagh;
- B106 Trewmount Road / Benburb Road - runs between Benburb, Moy and the M1;
- B103 Clonfeacle Road – runs between Benburb and Armagh Road A29; and
- B132 Maddan Road - runs from Keady to the A3 at Armagh.

The above roads have central delineating white lines, relatively high speeds and traffic flows.

2.4.2.3 C Class Roads

The C Class roads in the locality are:

- Derrynoose Road – connects the B3 Fergort Road with the L3530 across the border.

The above road has central delineating white lines and is approximately 6 metres wide.

2.4.2.4 Unclassified Roads

The following unclassified roads in the locality are more than 4 metres in width:

- Drumhillery Road;
- Hanslough Road;
- Brootally Road;
- Cormeen Road;
- Doohat Road;
- Artasooly Road;
- Tullysaran Road;
- Tullyneagh Road;
- Gorestown Road; and
- Culkeeran Road

The above roads do not have central delineating white lines however they have sufficient width for two vehicles to pass.

The following unclassified roads in the locality are between 3 and 4 metres in width:

- Bracknagh Road;
- Crossbane Road;
- Dernalea Road;
- Derrygally Way;

- Drumlee Road;
- Glassdrummond Road;
- Navan Fort Road;
- Rhone Road;
- Tullydowey Road;
- Tullyneagh Road;
- Gorestown Road;
- Culkeeran Road;
- Unclassified road off Killylea Road serving AT57,AT58, AT59 and AT60;
- Unclassified road off Tullycallidy Road serving AT62SL and AT63; and
- Unclassified road named Monaghan Road off Brootally Road.

The above roads do not have central delineating white lines, two cars should be able to pass each other, but wider vehicles would need to use informal passing opportunities along the roads to pass each other when this occurs.

The following unclassified roads in the locality are less than 3 metres in width:

- Ballyhoy Road;
- Cavanagarvan Road;
- Culrevog Road;
- Listrakelt Road;
- Major Lane;
- Sheetrim Road; and
- Tivnacree Road.

The above roads do not have central delineating white lines and are too narrow to allow two cars to pass each other. Informal passing opportunities along the road exist and are utilised by all traffic i.e. all vehicle types. The existing vehicle types are comparable to those used in the Proposed Development.

2.4.3 Traffic Management

The sign shown in photograph 1 was erected in 2008 by Roads Service Traffic Management Section to advise road users that Tullydowey Road was not suitable for heavy goods vehicles. There are no weak structures on this road and the sign is advisory, not mandatory.

The sign shown in photograph 2 on the Culrevog Road was not erected by Roads Service Traffic Management Section.

Photograph 1 - Restriction Advisory Sign – Tullydowey Road



Photograph 2 - Restriction Advisory Sign – Culrevog Road



2.4.4 Baseline Traffic Conditions

2.4.4.1 Traffic Census Data

The Roads Service Traffic and Travel Information 2006 – 2010 Annual Traffic Census has been consulted for relevant data. Traffic census data is currently not available for 2011-2013 as it has not yet been published. Historical traffic flow data for sites on the A and B-class roads in the vicinity have been examined as shown in Table 1 below. Further to this Table 2 shows both the total percentage growth and the percentage growth per annum between 2006 and 2010. The approximate locations of the counters are shown in Figure 4.

Table 1 - Traffic Census Data 2006-2009

REF NO.	LOCATION	2006		2007		2008		2009		2010	
		AADT	% HGV	AADT	% HGV	AADT	% HGV	AADT	% HGV	AADT	% HGV
417	A29 Keady Road	6,260	9.0	5,790	9.15	5,760	8.3	5,710	7.1	5,750	7.2
424	A3 Monaghan Road	6,660	11.0	6,880	11.06	6,580	10.6	6,490	10.1	6,260	9.9
428	B3 Derrynoose Road	5,520	7.0	5,290	6.62	5,290	6.0	5,210	5.9	5,040	4.7
440*	A29 Moy Road	-	-	10,580	11.1	10,500	10.7	10,510	9.7	10,310	10.0
442*	A3 Monaghan Road	-	-	5,010	13.41	4,580	13.2	4,340	13.2	4,230	13.7
606	A29 Armagh Road	10,750	9.0	10,860	9.12	10,550	8.8	10,600	8.1	10,250	7.9

* It should be noted that permanent Roads Service counters were not in places for either 440 or 442 in 2006

Table 1 shows that annual traffic levels are decreasing annually and therefore are currently undergoing negative growth.

2.4.4.2 Surveyed Traffic Count Data

Base traffic flow data was obtained from a series of Automated Traffic Counters (ATCs) installed within the study area in May 2012 and January 2013. The surveys took place at 42 locations within the area. Figure 5 details the locations of the ATC surveys. The results of these surveys are detailed in Table 2.

Table 2 - ATC Survey Results (May 2012 and January 2013)

SITE REF.	ROAD NAME	ROAD CLASSIFICATION	WEEKDAY DAILY TRAFFIC	% HGV
Site 1	Trewmount Road	B106	3,672	4%
Site 2	Moy Road	A29	8,522	8%
Site 3	Culverog Road	Unclassified	65	2%
Site 4	Benburb Road	B106	813	3%
Site 5	Confeacle Road	B103	1,846	5%
Site 6	Artasooly Road	Unclassified	490	5%
Site 7	Battleford Road	B115	2,432	5%
Site 8	Killylea Road	A28	4,721	7%
Site 9	Brootally Road	Unclassified	180	9%
Site 10	Dernalea Road	Unclassified	210	5%
Site 11	Drumhillery Road	Unclassified	423	6%
Site 12	Fergort Road	B3	642	6%
Site 13	Listrakelt Road	Unclassified	177	5%
Site 14	Monaghan Road	A3	6,180	8%
Site 15	Madden Road	B132	1,145	6%
Site 16	Carn Industrial Estate	B2	663	7%
Site 17	Derrygally Road	Unclassified	133	14%
Site 18	Major Lane	Unclassified	33	21%
Site 19	Culkeeran Road	Unclassified	149	17%
Site 20	Rhone Road	Unclassified	39	13%
Site 21	Gorestown Road	Unclassified	668	13%
Site 22	Drumlee Road	Unclassified	230	20%
Site 23	Tullydowey Road	Unclassified	51	18%
Site 24	Tullysaran Road	Unclassified	213	16%
Site 25	Tullneagh Road	Unclassified	282	15%
Site 26	Battleford Road	B115	1926	14%
Site 27	Bracknagh Road	Unclassified	45	20%
Site 28	Navan Fort Road	Unclassified	56	25%
Site 29	Cormeen Road	Unclassified	289	22%
Site 30	Unclassified	Unclassified	71	4%
Site 31	Tullcallidy Road	Unclassified	41	22%
Site 32	Ballyhoy Road	Unclassified	25	24%
Site 33	Unclassified	Unclassified	90	3%
Site 34	Dernalea Road	Unclassified	26	4%
Site 35	Hanslough Road	Unclassified	490	10%
Site 36	Cavanagarvan Road	Unclassified	66	6%
Site 37	Sheetrim Road	Unclassified	27	4%
Site 38	Glassdrummond Road	Unclassified	90	17%
Site 39	Unclassified	Unclassified	34	3%
Site 40	Derrynoose Road	C Road	678	19%
Site 41	Unclassified	Unclassified	12	8%
Site 42	Crossbane Road	Unclassified	54	4%

The total number of vehicles in any given hour for each of the ATC surveyed sites were used to determine overall peak hours for the study assessment period and the AM peak hour was found to be 08:00-09:00 and the PM peak hour 17:00-18:00. The peak hour calculations are shown in Annex 2.

With regard to the Saturday flows for the majority of survey sites, the Saturday flows are lower than the daily weekday flows and therefore the weekday is considered to be the worst case and a Saturday assessment is not required. Work will not occur on Sundays, so a Sunday assessment is also not required,

2.5 Estimating the Travel Generated and Modal Split

As described previously, the nature of the Proposed Development means that almost all the travel generated by the Proposed Development will be during the construction period and the majority of this will therefore be vehicular traffic and little or no travel by walk, cycle or public transport. The following sub-sections detail the traffic generated by the sub-station and overhead line and towers respectively.

2.5.1 Turleenan Substation

There are two aspects to the traffic generation for the development as follows:

- **Construction Phase Traffic** – This traffic would access the development site through the proposed temporary access during 2015-2017 and comprise of only construction traffic, see detailed description in 2.5.1.1.
- **Operational Traffic** – This traffic would access the proposed permanent access. The traffic would comprise of the vehicles associated with maintaining and running the substation, see detailed description in 2.5.1.2.

2.5.1.1 Construction Phase Traffic

As stated previously the construction phase is anticipated to start in 2015 for a period of 3 years until completion in 2017, and can be considered in the following seven segments:

- 1) Site Entrance
- 2) Access Road
- 3) Site Clearance, Landscaping and Preparation of Bund Construction
- 4) Install Drainage and Ducting
- 5) Construction of Roads and Bases Within Site
- 6) Installation of Equipment and Construction of Buildings
- 7) Completion of Access Road and Entrance, Including Final Surfacing

Summary

The substation is anticipated to be completed and operational in 2017.

2.5.1.2 Operational Traffic

Operational traffic would use the permanent access to the site from year 2017 and include the following:

- Operational traffic associated with the control building would be a maximum of 2 vehicles per day;
- Maintenance of the facility would be undertaken over a period of a 7 day period per calendar year and include 3 or 4 vehicles per day entering and exiting the site per day;
- An oil tanker would service the site every 6 months; and
- Estimated that once a year an excavator would need to access the site to undertake maintenance work on the SuDS pond.

2.5.1.3 Working Hours

During construction the site working hours will be restricted to 07:00 – 19:00 or hours of daylight Monday to Friday. Saturday working hours will be restricted to 07:00-13:00 or hours of daylight. No Sunday or night working except for emergency works (pumping of excavations, not construction).

2.5.1.4 Summary of Traffic Generation

Table 3 summarises the traffic generations for construction and operational traffic for weekday AM and PM peak hours and also daily flows. The traffic figures are based on a reasonable worst case i.e. the day on which the maximum daily traffic will be generated during construction and based on a 12hour working day. A 12 hour working day represents the majority of the working year and therefore using this scenario is considered to provide a robust assessment.

Construction traffic volumes have been based on a maximum daily flow of 200 vehicles, and peak hour calculation on the basis of a 12 hour working day relating to 16 vehicles per hour. i.e. 8 in and 8 out.

Operational traffic flows are on the basis of the maximum daily traffic within the year i.e. when operational and maintenance traffic occurs at the same time, and includes 1 operational vehicle arriving and departing within the peak hours. For the daily traffic generation it has been assumed that 4 maintenance vehicles would enter and exit the site in addition to the one operational vehicle entering and exiting the site.

Table 3 – Turleenan Substation Traffic Generation During Construction

TIME PERIOD	2015-2017 CONSTRUCTION TRAFFIC (VEHS)	2017 OPERATIONAL TRAFFIC (VEHS)
AM Peak Hour (08:00-09:00)	16	1
PM Peak Hour (17:00-18:00)	16	1
Daily	200	10

2.6 Overhead Lines and Towers Traffic Generation

The majority of the traffic generated by this aspect of the development is associated with the construction aspect through temporary accesses, once completed the traffic generations are negligible, as any future maintenance of the towers will require only minimal access (no less than once every two years, except in emergencies), either on foot or by 4x4 type vehicle via existing field gates or laneways.

The following details the construction methodology from which the traffic generations have been derived.

2.6.1.1 Construction Phasing

Five stages of work have been identified, as follows:

- Stage 1: Access Work – Initial site clearance, installation of temporary tracks and delivery of plant and equipment;
- Stage 2: Tower Foundations – Excavation of foundations, concrete infilling, backfilling of excavated materials;
- Stage 3: Steel Work – Delivery and construction of steel towers;
- Stage 4: Conductor/Insulator Installation – Installation of conductor and insulator through tensioners and pullers; and
- Stage 5: Reinstatement of Land - Once all works are complete, the access route and the construction areas around the tower are restored to their original condition.

Stage 1: Access Work

Stage 1 entails the preparation of the site for tower construction. Temporary tracks will be required to accommodate the heavier vehicles associated with the later phases. A total of 53 accesses will require stone. Generally, temporary tracks are constructed using 200mm stone placed directly on top of ground and compacted. Other site preparation works include such things as removal of hedges and fences and erection of temporary fencing.

Stage 2: Tower Foundations

Key activities for Stage 2 are the excavation of the foundations for the tower legs and the subsequent infilling of concrete. The volume of concrete required for the foundations depends on the tower type i.e. whether intermediate, 30 degree, 60 degree or 90 degree and also the ground conditions. Although some of the excavated soil will be backfilled and compressed, there will be a

volume of waste spoil which will have to be removed from site. . Depending on the ground conditions, temporary stoned working areas to construct the tower bases may be required to accommodate the heavier vehicles.

Stage 3: Steel Work

Within Stage 3 the steel for the tower is delivered and constructed on site. Only steel to be used that day would be delivered to the site in the morning, to avoid excess materials being located on site overnight. A Derrick Pole and Telescopic Loader would be used to assemble the tower.

Stage 4: Conductor / Insulator Installation

Stage 4 involves the stringing of the overhead conductor / insulator lines between towers, usually in sections of 10 consecutive towers. Overhead lines originate from tensioners on one side of the tower section and are fed through via pullers on the other side of the section. A pilot wire is pulled across the section via a heavy towing tractor to connect the tensioners.

Stage 5: Reinstatement of Land

Once all works are complete, the access route and the construction areas around the tower will be restored to their original condition. This will have the same levels of staff and vehicles as Stage 1.

Summary

Table 4 overleaf summarises the construction phases and the associated vehicle types, staff requirements and number of days. It should be noted that Stages 1-5 described above relate to the physical construction of the towers through the designated access tracks. Further access is also required to complete the stringing of the overhead line, through further 'Stringing Location' accesses and 'Guarding location' accesses (see 2.6.1.4 for more detail regarding traffic generations).

Table 4 – Summary of Construction Methodology for Overhead Line and Towers

STAGE	DESCRIPTION	ACTIVITIES	VEHICLE TYPES REQUIRING ACCESS	NO. OF STAFF	TYPICAL WORK DAYS	
					TOWER TYPE	DAYS
1	Access Work	Delivery of plant and equipment Site clearance Installation of temporary tracks (if required)	Fastrac/tractor + low loader trailer carrying dumper / fencing equipment / excavator / rock breaker (if required) Tipper Lorry (22 tonnes) – only when stone required Transit type van	3	Inter	1
					30	1
					60	1
					90	1
2	Tower Foundations	Delivery of plant and equipment Removal of surplus material Concrete filling of foundations	Tractor and trailer Concrete lorry (8 cubic metres) Transit type van	6	Inter	3
					30	4
					60	6
					90	6
3	Steel Work	Delivery of plant and equipment Delivery of steel Construction of tower	Flatbed lorry (26 tonnes) Tractor and trailer Fastrac/tractor + low loader trailer carrying Derrick Pole / Telescopic Loader Transit type van	8	Inter	3
					30	4
					60	4
					90	4
4	Conductor/ Insulator Installation	Delivery of plant and equipment Stringing of line Removal of spent drums	Fastrac/tractor + low loader trailer carrying puller tensioners / conductor drums / stringing wheels / compressor and heads / quad bikes Tractor and trailer Transit type van	15	Inter	7
					30	7
					60	7
					90	7
5	Reinstatement of Land	Delivery of plant and equipment Site clearance Removal of temporary tracks (if required)	Fastrac/tractor + low loader trailer carrying dumper / fencing equipment / mini-digger Tractor and trailer Transit type van	3	Inter	1
					30	1
					60	1
					90	1

2.6.1.2 Construction Schedule / Period

It is estimated that the construction period in any particular location along the overhead line route will be in the order of 4 – 6 months. This is because all of the Stages of the construction can not follow immediately on from one another an example being that once Stage 2 is completed i.e. the concrete poured for the base, the steel cannot be erected until the concrete has set adequately, which is estimated to take at least 4 weeks. Furthermore once the steel work is completed in Stage 3, Stage 4 cannot follow directly after unless enough of the towers have been constructed to allow the stringing of the conductor to take place. In summary the traffic generated by each of the access points will occur for short periods of time with breaks between all Stages except Stages 1 and 2.

NIE intends to instruct the contractor to provide two construction teams, at this point estimated to complete towers 1-51 and 52-102 respectively.

2.6.1.3 Working Hours

During construction the site working hours will be restricted to 07:00 – 19:00 or hours of daylight Monday to Friday. Saturday working hours will be restricted to 07:00-13:00 or hours of daylight. No Sunday or night working except for emergency works (pumping of excavations, not construction).

2.6.1.4 Summary of Traffic Generation

Tower Accesses

NIE, in association with ESBI have undertaken a study of the prevailing ground conditions in the proposed tower locations to all best estimates of the requirements for stone, spoil disposal and concrete. Annex 3 includes details of each of the access points, the tower types and the estimates of stone, spoil disposal and concrete. This has allowed the daily traffic generations to be calculated.

As identified earlier, the peak hours for background traffic are 08:00-09:00 and 17:00-18:00. Development traffic generations for these periods have been calculated based on the peak daily traffic for the particular access with flows apart from staff arrivals and departures (assumed to arrive before and depart after the designated peak hour times) split uniformly over a 12 hour working day. The traffic figures are based on a reasonable worst case i.e. the day on which the maximum daily traffic will be generated during construction and based on a 12hour working day. A 12 hour working day represents the majority of the working year and therefore using this scenario is considered to provide a robust assessment. Although the working day hours can decrease in winter periods, as the traffic generations are based on the peak daily flow it is considered to represent a robust assessment of likely traffic flows.

The peak daily traffic generated by the proposed temporary accesses varies between 15 and 58 vehicles per day. Average daily traffic flows range between 6 and 26 vehicles per day. The total days used by the majority of accesses would be 15 construction days however, for the access track providing access to Towers 3, 4, 5 and 6 would be used for a period of 57 construction days.

Stringing Location Accesses

Stringing locations will be used for a maximum of 5 days and will have a maximum daily traffic flow of 20 vehicles per day.

Guarding Locations

Guarding locations will require access by 1 or 2 vehicles daily over a period of 5 days.

3 Influencing Travel to the Proposed Development

3 Influencing Travel to the Proposed Development

3.1 Introduction

The Transport Assessment guidelines, suggest that this section of the assessment details methods used by the Proposed Development to influence travel to the development. The nature of the development means that the majority of the trips generated by the development temporary as they are, are associated with construction, with negligible trips once complete therefore the use of trips by cycling, walking and public transport modes is limited. The main permanent feature of the development proposals, i.e. the substation at Turleenan, is unmanned and will only have occasional requirements for access. Given the operational requirements of this Proposed Development there are limited opportunities to influence travel to the Proposed Development.

3.2 Location

The location of the development has been chosen based on the operational requirements of creating a 400kV overhead line and associated substation. However, as stated previously, the nature of the development means that the majority of the trips generated by the development are associated with construction, with negligible trips once complete therefore the use of more sustainable modes is unlikely. Furthermore in the case of the Proposed Development the positioning has been governed by existing electricity facilities i.e. the proposed substation compound has been aligned with NIE's existing 275kV overhead line and will allow connection to the proposed 400kV overhead line. This will in turn provide connection to existing facilities in the Republic of Ireland.

Notwithstanding this, the substation which is the only aspect of the Proposed Development which requires regular access post construction, accesses directly onto Trewmount Road (B106).

3.3 Scale

The scale of the development can influence travel behaviour, but in this instance the scale is governed by existing electricity facilities it is providing a connection between. The size of the substation and number of towers required is directly related to this. However, the minimal nature of the traffic generation once completed, means that development scale does not influence travel behaviour, and therefore is not considered further in this assessment.

3.4 Layout and Design of the Development

With regard to temporary and permanent accesses proposed for the substation, these have been designed taking cognisance of appropriate guidance given their nature and location.

Facilities for the mobility impaired are not included within the design due to the nature of the proposal and its location.

3.5 Promoting Access on Foot

Due to the rural location of the sites and their type and function, the facilities for pedestrians are unlikely to influence travel to the sites and therefore they have not been considered further in this assessment.

3.6 Promoting Access on Bicycle

Existing dedicated facilities for cyclists are not present in the locality of the Proposed Development sites, and it is not proposed to provide any further facilities as part of the development proposals as they are unlikely to influence to the sites and therefore are not considered further in this assessment.

3.7 Promoting Public Transport Access

It is not considered that the development sites will give rise to the use of stage carriage bus services or use of rail services. It is anticipated that staff would travel to the sites primarily by private mini-bus / works vehicles.

3.8 Managing Car Use and Parking

3.8.1 Traffic Management

Vehicle movements associated with the construction of the development are likely to come from / go to a number of locations including the Carn depot, concrete suppliers, quarries and landfill sites. Haul routes for construction activities have been identified and are to be agreed with Roads Service and the appointed contractor as part of the construction traffic management plan (see Section 4.5.1 re further detail on haul routes). It is also proposed that the contractor will use temporary traffic management measures to minimise disruption to the road network. These measures will be required at a minority of tower access locations and then for certain types of deliveries only. The temporary traffic management measures will include single vehicle working and other associated measures extracted from Chapter 8 of the Traffic Signs Manual.

3.8.2 Parking

With regards to the substation, throughout the construction phase and also once operational, parking will not be permitted on the public roads or on the verges. All construction related vehicles will park within the confines of the construction site.

To help further minimise any parking, construction staff will be required to travel to/from the construction sites via mini-buses/ work vehicles.

With regard to the permanent substation, once operational the proposed substation will have a total of 6 no. parking spaces.

3.8.3 Traffic Impacts

The traffic impact analysis of the traffic flows generated by the Proposed Development is included within Section 4.8 of this report. The assessment has regard to the Institution of Highways and Transportation publication, 'Guidelines for Traffic Impact Assessment'.

3.9 Committed Developments

Planning Service does not provide planning consultants with an indication of planning histories. Therefore, a search of planning applications was conducted within a 5km radius of the site through the third party search website Planning online (<http://www.planningonline.co.uk/pol/about.jsp>).

The search identified two applications in the area which have been granted permission and could be of significance in terms of impact due to site development and potential accesses.

- M/2010/0870/F - Proposed Housing Development consisting of 47No. Dwellings (3No. Detached, 34No. Semi-Detached and 10No. Townhouses) and associated site works, located at Clonfeacle Road.
- O/2012/0460/F - Housing development and associated site works consisting of 2No. Detached Dwellings and 3No. Townhouses, located at Maydown Road.

As these have been granted permission they have been considered as committed within the Transport Assessment.

In order to take account of the traffic implications of the aforementioned committed developments within the traffic impact analysis, the volumes of traffic generated have been calculated based on the interrogation of the latest TRICS database –

version 2012 (b). In order to provide a robust assessment, 85th percentile trip rates have been used to estimate the traffic flows. Table 18.7 below, shows the anticipated traffic generation.

The trip rates are per dwelling for mixed private housing. In the AM peak the two developments generate 6 arrivals and 19 departures. In the PM peak 34 arrivals and 22 departures are generated.

Table 5 – Committed Developments Traffic Generations

SITE REF.	LOCATION	PEAK HOUR	85 TH PERCENTILE TRIP RATES			TRAFFIC GENERATION		
			ARR	DEP	TOTAL	ARR	DEP	TOTAL
M/2010/0870/F	Clonfeacle Road	08:00-09:00	0.110	0.335	0.445	5	16	21
		17:00-18:00	0.562	0.363	0.925	28	18	46
O/2012/0460/F	Maydown Road	08:00-09:00	0.110	0.335	0.445	1	3	4
		17:00-18:00	0.562	0.363	0.925	6	4	10

3.10 Summary

The majority of the traffic generated by the development will be temporary construction traffic therefore the use of more sustainable modes is limited.

4 Appraising and Mitigating Impact

4 Appraising and Mitigating Impact

4.1 Introduction

This final stage of the Transport Assessment involves the assessment of the traffic impacts and devising approaches to minimise or deal with the impacts, where applicable.

4.2 Accessibility and Integration Impacts with the Local Community

Impacts under accessibility and integration include:

- Access to transport systems, access to the local area and community severance; and
- Integration between transport systems and with other land-uses.

4.2.1 Access to Public Transport System

Given the nature of the Proposed Development, the section on transport systems is not considered relevant. There are temporary access points to the towers for construction purposes, however links by foot, cycle and public transport are not considered relevant.

4.2.2 Access to Local Area

In terms of access to the local area, given the nature of the Proposed Development, and given the majority of work is temporary in nature, this element has not been considered further.

4.2.3 Community Severance

The construction of the Proposed Development will result in a temporary increase in traffic and temporary traffic management measures (see section 4.8). It has been assessed that this will not result in any likely significant effects to community severance because of the duration and scale of the impacts.

The operation of the Proposed Development, post construction, will not result in any community severance as there will be very few associated traffic movements and no impacts to the existing road network.

4.2.4 Integration

In terms of integration between land use and transport it is unlikely that the proposals will influence interchange between modes, given the nature of the development proposals.

4.3 Safety and Security Impacts

The two main areas of safety impacts to be assessed are:

- The risk of traffic related collisions for those using and passing by the sites; and
- Feelings of insecurity for those using and passing by the sites.

In the first instance the traffic accident history of the study area has been obtained. Table 7 overleaf details the accident data between 2008 and 2010 (the latest available at the time of writing); the table details the accident severity and proximity to nearest access point.

Table 6 - Accident Data 2008 - 2010

YEAR	REF	LOCATION	PROXIMITY TO NEAREST ACCESS POINT	SEVERITY OF COLLISION	SEVERITY OF CASUALTY		
					SLIGHT	SERIOUS	FATAL
2008	1	Moy Road	160m	SLIGHT	1	0	0
	2	Drumgrannon Road	750m	SLIGHT	1	0	0
	3	Drumgrannon Road	825m	SLIGHT	1	0	0
	4	Tullyneagh Road	10m	SLIGHT	1	0	0
	5	Dernalea Road	10m	SLIGHT	2	0	0
2009	6	Drumgrannon Road	825m	SLIGHT	1	0	0
	7	Clonfeacle Road	350m	SLIGHT	2	0	0
	8	Clonfeacle Road	700m	SLIGHT	1	0	0
	9	Monaghan Road	400m	SERIOUS	0	1	0
	10	Monaghan Road	200m	SLIGHT	1	0	0
2010	11	Gorestown Road	1000m	SLIGHT	2	0	0
	12	Benburb Road	200m	SLIGHT	1	0	0
	13	Clonfeacle Road	10m	SERIOUS	0	1	0
	14	Battleford Road	430m	SLIGHT	1	0	0
	15	Cormeen Road	310m	SLIGHT	1	0	0
	16	Monaghan Road	500m	SERIOUS	2	1	0
	17	Not Known	600m	SLIGHT	3	0	0

Accident reference numbers 4, 5 and 13 are located 10 metres from the nearest Tower access point respectively. The following provides further information regarding these accidents:

- **Tullyneagh Road (Accident Ref 4)**
 - Vehicles involved: - Collision involving one motorcycle
 - Weather/ road conditions: - Raining and wet road
 - Collision details: - Going ahead around right hand bend, object in carriageway
- **Dernalea Road (Accident Ref 5)**
 - Vehicles involved: - Collision involving two cars
 - Weather/ road conditions: - Bright and dry road
 - Collision details: - Car going around right hand bend skidding with car behind colliding into it
- **Clonfeacle Road (Accident Ref 13)**
 - Vehicles involved: - Collision involving car and HGV>7.5t
 - Weather/ road conditions: - Raining and wet road
 - Collision details: - Car going around left hand bend skidded into oncoming HGV

The accidents detailed above were either caused by wet road conditions or driver error and the accident history data shows that there have not been three or more accidents at the same location on the network. This is a 'normal' indication that no remedial work is required.

As the majority of the sites are accessed via existing field gates, their locations and use by similarly sized vehicles is already known to those using them and passing them. This will lessen the risk of collisions and insecurity and on this basis, and taking account of the mitigation measures proposed later, it is not proposed to undertake road safety audits.

A road safety audit is not a check with compliance of design standards. The primary purpose of road safety audits is to identify potential road safety hazards within a scheme. As all the sites are accessed via existing access points, their location and use by similarly sized vehicles is already known to those who use them and pass by them. This will lessen the risk of collisions and insecurity. On this basis, and taking account of the mitigation measures proposed later, the relatively low flows and limited time of duration, roads safety audits are not required.

4.4 Environmental Impacts

The environmental impacts of the Proposed Development are detailed out with this Transport Assessment and are considered in detail within the Environmental Statement Chapter 18.

4.5 Highway and Traffic Impacts

4.5.1 Haul Routes

Annex 8 includes a summary of the haul routes for the proposed overhead line and towers, based on the location of the majority of local suppliers of stone and concrete and landfill facilities as well as the depot for the Proposed Development at Carn Industrial Estate. The towers have been split into sections depending on their access proposals.

Again, as previously described a difficulty encountered in regard to the identification of haul routes for the Proposed Development is that suppliers cannot be specified at this stage. On this basis haul routes to/from quarries, concrete supplier and landfills can only be assessed so far as the route from the nearest A or B class road to the development sites.

4.6 Construction Management

It should be noted that NIE intends to instruct the contractor to provide two construction teams for the towers aspect of the development, at this point estimated to complete towers 1-51 and 52-102 respectively. As the Proposed Development crosses 34km of land, this means that the two teams will be working in areas whereby for example access from Carn Industrial Estate would be via different approaches e.g. via the M1 or B28 for the northern end of the development and via the A3 for the southern end of the development. Therefore no interaction between the two teams is anticipated, as the first team approaches tower 51 for construction, the second team will be approaching tower 102 for construction. This working methodology means that the cumulative effects of the two teams working in the same area (accessing the same roads) will not occur.

4.7 Calculation of Traffic Impacts

4.7.1 Development Traffic

The estimated traffic generations are described in Sections 2.4.1.4 and 2.4.2.4.

4.7.2 Forecast Background Traffic

A number of traffic count surveys were undertaken in 2012 and 2013 for the purposes of this traffic assessment, as detailed in Section 2.3.4. It has been decided to use 2013 as the common base year, without growing the 2012 data. This methodology is based on the short period of time at which the surveys were completed i.e. November 2012 and January 2013. As there was only

3 months between these two batches of surveys and the majority of the surveys were conducted in 2013, the most appropriate combined base year for the data for the purposes of this assessment is considered to be 2013.

Section 2.3.5 details historical traffic flow figures taken from the Traffic Census of Northern Ireland. From 2006 to 2010 (latest data available) traffic levels relevant to the study area are in negative growth therefore assuming no growth between 2012 and 2013 survey data, is a reasonable assumption.

Notwithstanding this, as the Roads Service permanent Automatic Traffic Counters (ATCs) are in varying locations in the study area it has been decided to use NRTF low growth factors, in order to present a robust assessment i.e. a worst case scenario in terms of traffic forecasts.

Construction of the scheme is expected to commence in 2015 and be completed by with the year of opening for the substation detailed as 2017 and the applicable National Road Traffic Forecasts (NRTF) growth factors were applied to the baseline traffic figures to produce the forecast background traffic flows for the scheme, see Table 7.

Table 7 – NRTF Growth Factors Used in this Assessment

NRTF	TOTAL GROWTH FACTOR
Low All Traffic 2013-2015	1.023
Low All Traffic 2013 – 2017	1.042

With regard to traffic generated by committed developments within the study area, previously detailed in Section 3.9, it is considered that as NRTF low growth traffic is being used in the assessment that traffic associated with the developments is therefore already allowed for.

4.7.2.1 Traffic Impacts

Section 3.1.5 of the IHT Guidelines for Traffic Impact Assessment (1994) recommends that a detailed impact analysis is required where one or other of the following thresholds are exceeded:

- Traffic to and from the development exceeds 10 percent of the existing two-way traffic flow on the adjoining highway; or
- The development traffic exceeds 5 percent of the existing two-way traffic flow on the adjoining highway where traffic congestion exists or will exist within the assessment period or in other sensitive locations.

The 10% threshold has been adopted in this assessment, as there is no existing congestion on the surrounding road network. The substation and towers will be considered separately within this section of the report due to the differing characteristics with regard to access and traffic generations i.e. Turleenan substation will have a permanent access and the towers will have only temporary accesses for construction.

4.7.2.2 Turleenan Substation Traffic Impacts

Table 8 shows the traffic impacts for the substation during the construction phase and Table 9 shows the impacts once operational in year of opening 2017 and design year 2027. All percentage impacts are below the threshold value of 10% therefore no further detailed traffic assessment is required.

Table 8 – Turleenan Substation Traffic Impacts on Trewmount Road - Construction Phase

TIME PERIOD	TREWMOUNT ROAD 2015 BACKGROUND TRAFFIC (VEHS)	PEAK CONSTRUCTION DEVELOPMENT TRAFFIC (VEHS)	% IMPACT
2015 AM Peak Hour (08:00-09:00)	283	16	5.7%
2015 PM Peak Hour (17:00-18:00)	390	16	4.1%
2015 Daily Traffic	3,782	200	5.3%

Table 9 – Turleenan Substation Traffic Impacts on Trewmount Road – Operational Phase

TIME PERIOD	TREWMOUNT ROAD BACKGROUND TRAFFIC (VEHS)	PEAK DEVELOPMENT TRAFFIC (VEHS)	% IMPACT
2017 AM Peak Hour (08:00-09:00)	291	1	0.3%
2017 PM Peak Hour (17:00-18:00)	401	1	0.2%
2017 Daily Traffic	3,881	10	0.3%
2027 AM Peak Hour (08:00-09:00)	321	1	0.3%
2027 PM Peak Hour (17:00-18:00)	443	1	0.2%
2027 Daily Traffic	4,286	10	0.2%

4.7.2.3 Overhead Line and Towers Traffic Impacts

The same forecasting approach detailed in Section 4.5.1 has been undertaken with regard to the calculation of background traffic flows for this aspect of the development. Construction of the scheme is expected to commence in 2015 until completion in 2017. The assessment year has been taken as 2015.

Annex 4 shows the traffic impacts for the overhead line and towers in assessment year 2015. In total there are a total of 25 locations on the network where the traffic impacts are over the threshold value of 10%, as follows:

- 1) Derrygally Way
- 2) Major Lane
- 3) Culkeeran Road
- 4) Rhone Road
- 5) Culrevog Road
- 6) Drumlee Road
- 7) Tullydowey Road
- 8) Artasooly Road
- 9) Tullysaran Road
- 10) Tullyneagh Road
- 11) Bracknagh Road
- 12) Navan Fort Road
- 13) Cormeen Road
- 14) Unclassified road used by access AT57
- 15) Ballyhoy Road
- 16) Brootally Road
- 17) Dernalea Road
- 18) Hanslough Road
- 19) Cavanagarvan Road
- 20) Sheetrim Road
- 21) Tivnacree Road

- 22) Glassdrummond Road
- 23) Listrakelt Road
- 24) Derrynoose Road
- 25) Unclassified road used by access AT102

4.7.2.4 Summary

The traffic generated by the proposed substation at Turleenan has been shown to be below the 10% threshold value for detailed assessment therefore no further work to mitigate the effects of generated traffic is required.

With regard to the construction of the overhead line and towers, there are 25 locations where the threshold value of 10% has been exceeded. These locations have been considered in more detail within Section 4.8.

4.8 Detailed Traffic Assessment

The Transport Assessment guidelines state in Section 4.111 "The significance of a traffic impact depends not only on the percentage increase of traffic but the available capacity. A 10% increase on a lightly trafficked road may not be significant, whereas a 1% increase on a congested road will be".

Taking this into account methods to assess the capacity of the affected roads have been identified, including:

- Calculation of Congestion Reference Flows (CRF) - The CRF of a link is an estimate of the Annual Average Daily Traffic (AADT) flow at which the carriageway is likely to be congested in the peak periods on an average day (DMRB Volume 5 Section 1 TA 46/97 'Traffic Flow Ranges for use in the Assessment of New Rural Roads'); and
- Traffic flow implications from first principles i.e. deriving a 12 hour flow profile for a typical day and adding the hourly generated traffic flows to get an indication of impacts in each hour.

4.8.1 Congestion Reference Flows

As per Transport Assessment Guidelines notes, the significance of a traffic impact not only depends on the percentage increase of traffic but also the available capacity. As a way of assessing the impacts of the temporary traffic generated by the construction traffic (the post construction traffic impacts are considered negligible) Congestion Reference Flows (CRF) have been examined. The CRF of a link is an estimate of AADT flow at which the carriageway is likely to be congested in the peak periods on an average day. For the purposes of calculating the CRF, congestion is defined as the situation when the hourly traffic demand exceeds the maximum sustainable hourly throughput of the link.

Links of the same road class and standard will have different CRF values which are determined by the applicable traffic flows and the value of the proportion of heavy vehicles and peak hour to daily flow ratio as well as local variants and peak hour directional split.

The CRF of a link is given by the formula:

$$\text{CRF} = \text{CAPACITY} * \text{NL} * \text{Wf} * 100/\text{PkF} * 100/\text{PkD} * \text{AADT}/\text{AAWT}$$

CAPACITY – is the maximum hourly lane vehicle flow (includes percentage of HGVs)

NL – is the number of lanes per direction

Wf – is the width factor

PkF – is the proportion (%) of the total daily flow (2way) that occurs in the peak hour

PkD – is the directional split (%) of the peak hour flow

AADT – is the Annual Average Daily Traffic flow on the link

AAWT – is the annual average weekday traffic flow on the link

In relation to the Proposed Development, the CRF has been calculated for 25 roads which are anticipated to experience a higher than 10% level of traffic impacts due to temporary construction traffic.

Within the guidelines relating to CRF calculations when the road width is less than 5.5 metres, the traffic analyst must use judgement to decide on the relevant value for width factor. For the purposes of this assessment, the calculations do give an initial indication of the level of capacity available. To further substantiate this information hourly traffic profiles have been created for each of the roads in question and detailed in the following subsection.

Table 10 summarises the CRF calculations for the affected roads and also the maximum predicted daily flows. In all cases it has been shown that there is adequate capacity to facilitate the predicted traffic generated by the development. Therefore whilst the percentage impacts may be above the 10 % threshold the operational capacity of the roads are such that the temporary flows associated with the construction of the towers can be accommodated.

Table 10 – CRF Calculations

ROAD NAME	CRF	MAXIMUM PREDICTED DAILY FLOW		
		BACKGROUND	MAX DEV	TOTAL
Derrygally Way	1,609	136	38	174
Major Lane	2,608	34	15	49
Culkeeran Road	3,684	152	15	167
Rhone Road	2,926	40	54	94
Culverog Road	836	61	38	99
Drumlee Road	2,398	235	20	255
Tullydowey Road	3,355	52	15	67
Artasooly Road	2,293	460	56	516
Tullysaran Road	8,876	218	30	248
Tullyneagh Road	2,310	288	36	324
Bracknagh Road	2,296	46	42	88
Navan Fort Road	3,176	57	34	91
Cormeen Road	7,073	296	21	317
AT 57-60	2,882	73	40	113
Ballyhoy Road	2,989	26	18	44
Brootally Road	1,225	168	22	190
Dernalea Road	1,327	210	40	250
Hanslough Road	9,594	501	40	541
Cavanagarvan Road	2,611	68	48	116
Sheetrim Road	3,227	28	36	64
Tivenacree Road	3,073	35	44	79
Glassdrummond Road	4,197	92	30	122
Listrakelt Road	1,024	174	36	210
Derrynoose Road	11,359	694	36	730
AT 102	793	12	30	42

It should be noted that the CRF is affected by proportion of HGVs so a narrower lane might have a higher capacity because the proportion of HGVs is low.

4.8.2 Traffic Flow Implications from First Principles

Typical weekday daily traffic profiles over a 12 hour period, 07:00-19:00 have been derived from the ATC survey data for the roads under assessment and growthed to the first year of construction; 2015, see Annex 6.

Each profile shows the following:

- 2015 forecast background traffic for each hour period, 07:00-19:00;
- Maximum daily generated traffic for each hour period, 07:00-19:00;
- Total hourly flow for background and development traffic; and
- The total estimated flow per minute for each hour period i.e. background plus development traffic (on the day of maximum development traffic).

It should be noted the flows included in the calculations are the worst case scenario, i.e. the peak daily construction flow, therefore for the majority of construction days the traffic flows would be less. Furthermore the construction period is for a limited number of days.

The purpose of the above process is to give an indication of the traffic flows on the affected roads in practical terms i.e. the traffic flow demand over the hour period. Table 11 overleaf summarises the peak hourly demand for each of the roads under consideration and the total number of days affected i.e. number of construction days. However, it should be noted that the peak development flows are assessed in the table and that for the majority of other days the development traffic flows would be lower.

Due to the nature of the study area, a number of the roads are unclassified and a column within Table 11 provides an indication of the roads widths. They have been calculated on the basis of topographical survey information collected as part of the study. Where more than one topographical survey was undertaken the road width was calculated as the average of a number of widths. It also includes a column which indicates the number of informal passing opportunities available on each of the roads. There are locations along the routes which are narrow and which currently act as areas where two vehicles can pass each other should they meet.

Table 11 – Summary of Maximum Predicted Hourly Flows and Details of Passing Opportunities

ROAD	ROAD WIDTH	NO. OF DAYS AFFECTED	MAX HOUR FLOW (BACKGROUND+ DEV)			COMMENT
			BACK-GROUND	DEV	TOTAL	
Derrygally Way	3.6	19	17	3	20	Only a short section of this road will be used to access track
Major Lane	2.7	15	2	8	10	16 informal passing opportunities
Culkeeran Road	4.2	49	23	1	24	Sufficient road width for two cars to pass and 14 passing opportunities up to junction with Rhone Road
Rhone Road	3.0	38	6	5	11	12 informal passing bays between junctions with Syeria Rd and Culkeeran Rd
Culrevog Road	2.9	73	6	5	11	16 informal passing opportunities
Drumlee Road	3.0	26	39	4	43	14 informal passing opportunities
Tullydowey Road	3.2	51	5	5	10	8 informal passing opportunities
Artasooly Road	4.7	122	49	5	54	Sufficient road width for two vehicles to pass unhindered
Tullysaran Road	4.9	49	26	3	29	Sufficient road width for two vehicles to pass unhindered
Tullyneagh Road	4.4	15	36	2	38	Sufficient road width for two vehicles to pass unhindered and 15 passing opportunities
Bracknagh Road	3.8	84	7	3	10	14 informal passing opportunities
Navan Fort Road	3.0	39	6	3	9	Only a section of this road will be used to reach the access tracks off Killylea Road. Along this section there are 15 informal passing opportunities
Cormeen Road	5.3	34	38	1	39	Sufficient road width for two vehicles to pass unhindered
Unclassified road - AT57	3.7	67	12	3	15	8 informal passing opportunities
Ballyhoy Road	2.7	15	3	3	6	5 informal passing opportunities
Brootally Road	3.9	45	15	2	17	20 informal passing opportunities
Dermalea Road	3.7	49	6	3	9	12 informal passing opportunities
Hanslough Road	5.0	19	58	3	61	Sufficient road width for two vehicles to pass unhindered
Cavanagarvan Road	2.7	67	7	4	11	12 informal passing opportunities
Sheetrim Road	2.7	104	5	3	8	16 informal passing opportunities between junctions with Cavanagarvan Road and Drumhillery Road
Tivnacree Road	2.8	49	6	3	9	Section between Cavanagarvan Road and Glasdrummond Road to reach the required access tracks - 11 informal passing opportunities
Glassdrummond Road	3.2	30	13	2	15	29 informal passing opportunities
Listrakelt Road	2.5	68	18	3	21	24 informal passing opportunities
Derrynoose Road	6.0	45	60	4	64	Sufficient road width for two vehicles to pass unhindered
Unclassified Road - AT102	2.8	19	1	3	4	This road branches off the Doohat Road and there are 5 informal passing opportunities

4.8.3 Consideration of Impact on Road Pavements and Below Pavement Infrastructure

The condition of road pavements depends on a number of specific factors including, pavement / foundation /sub grade make up, loading to date, past maintenance levels, annual average axle loading, traffic growth, etc. In order to assess this matter, we have conducted an initial desk top assessment of the typical roads intended for access use and the likely impact of the construction vehicles on these roads.

There are basically three main categories of road that will be utilised, to service the construction of the substation and towers forming the interconnector project. These include Motorways and A Roads, B Roads and Unclassified Roads. Each is discussed in turn below

4.8.3.1 Motorway and A Roads

These are primary routes carrying higher traffic volumes with a high percentage of commercial vehicles. These roads will have long life designs, capable of withstanding numerous repeated standard axles and maximum UK axle loadings throughout their life. The majority of these roads form part of the strategic road network for Northern Ireland and will have been designed (or will have been assessed to confirm that they are designed) in accordance with the DMRB. These roads will be constantly monitored and maintained by the overseeing authority. The below pavement infrastructure (i.e. pipes and culverts will also have been designed (or will have been assessed) to comply with the standards established in the DMRB with high factors of safety.

The overall impact on road pavements and below ground infrastructure on Motorways and Class 'A' Roads from construction vehicles, in comparison with current traffic, is considered negligible. Construction vehicles will have axle loading factors that are well within the general usage figures for roads of this nature.

4.8.3.2 B Roads

These tend to be secondary routes, but will also have been designed to meet DMRB standards. The traffic volumes will be less than those for Motorways and A Roads, but will again have been designed to accommodate a significant volume of commercial vehicles. These roads tend to be monitored on a cyclic basis and entered into the system for major or minor maintenance or accepted until the next assessment. The below ground infrastructure will again have been designed to (or will have been assessed to) comply with DMRB standards.

The overall impact on road pavements and below ground infrastructure on Class 'B' Roads from construction vehicles, in comparison with current traffic, is considered low to moderate. A visual assessment of these routes will be undertaken and a condition report prepared and agreed with Road Service prior to commencement of the works. As the roads are classified and maintained by Road Service, an agreement on monitoring strategy will be agreed with them. The residual impact is likely to be slight.

4.8.3.3 C Class and Unclassified Roads:

These roads tend to serve as local access to business and residential properties, linking them with the classified road network. Road Service is again responsible for operating and maintaining these roads, in Northern Ireland, as for the classified roads. However, the pavement construction associated with the vast majority of these roads will not have been designed to meet or comply with DMRB standards, neither will the below ground infrastructure. The maintenance of these routes is likely to be on a passive ad-hoc basis, i.e. in direct response to localised failure. The construction of these roads will vary greatly and will be highly inconsistent and related to the historical formation of the route.

The impact on road pavements and below ground infrastructure on unclassified roads from construction vehicles, in comparison with current traffic, is considered moderate, however the following section on mitigation shows this can be ameliorated.

4.8.4 Impacts at Temporary Accesses to Towers

The locations of the temporary accesses used in the development proposals were identified in extensive on-site survey work undertaken by NIE. Where possible existing field gates and laneways have been used on the premise that they are being used currently by large farm machinery and therefore similar to the vehicles proposed to construct the towers. Vehicles will therefore be able to pull off the public road and undertake their operations without impacting on local traffic. As part of the transport

assessment process the accesses have been assessed with regard to their use during the construction of the towers and overhead line. These access points are identified in Annex 1.

A series of AutoTrack assessments have been undertaken at the proposed entrance points. These have been undertaken on topographic survey bases to increase accuracy. These were tracked for a worst case scenario, which includes:

- Fastrac vehicle with 8 metre trailer;
- 8 cubic metre concrete lorry; and
- Where applicable tipper trucks for stone delivery.

Out of the total 104 temporary accesses associated with the construction of the overhead line and towers a total of 59 accesses cannot facilitate the required manoeuvres associated with the construction vehicles without enhancement/mitigation measures either at the access or en route from the nearest feeder road. The accesses include the following:

- Derrygally Way – AT2
- Major Lane – AT7
- Culkeeran Road – AT10
- Rhone Road – AT13 and AT14
- Culrevog Road – AT18 and AT19
- Benburb Road – AT20, AT26
- Drumlee Road – AT24-25
- Clonfeacle Road – AT29
- Tullydowey Road – AT30, AT31-32A, AT32B
- Artasooly Road – AT33, AT34, AT35
- Tullysaran Road – AT41A, AT41B-42
- Tullyneagh Road – AT43
- Battleford Road – AT45
- Bracknagh Road – AT47, AT48A, AT49, AT50
- Navan Fort Road – AT51, AT52, AT52SL
- Killylea Road – AT54
- Brootally Road – AT65, AT67
- Dernalea Road – AT71SL2, AT72
- Unclassified Road – AT74
- Maddan Road – AT74SL1, AT74SLB, AT74SL2
- Unclassified Road – AT75
- Hanslough Road – AT76
- Cavanagarvan Road – AT77-78A, AT77-78B, AT79
- Sheetrim Road – AT80, AT81, AT82, AT83A, AT83B, AT84
- Drumhillery Road – AT86
- Tivnacree Road – AT89, AT90
- Glassdrummond Road – AT91
- Unclassified Road – AT93-94
- Listrakelt Road – AT97, AT98
- Doochat Road – AT99
- Derrynoose Road – AT100
- Unclassified Road – AT102A, AT102B

Annex 9 includes a table showing the assessment of the access tracks and identifies what type of mitigation/enhancement measures are required i.e. access improvements or en route improvements.

Annex 9 also includes the AutoTrack assessments of the accesses where the required manoeuvres can be accommodated, and therefore no mitigation/enhancement is required. These accesses total 45 and include:

- Trewmount Road – AT1, AT3-4-5-6
- Moy Road – AT8-9
- Culkeeran Road – AT11, AT12
- Gorestown Road – AT15
- Culrevog Road – AT16-17
- Benburb Road – AT21, AT22-23
- Drumlee Road – AT23SL, AT27-28
- Artasooly Road – AT33SL, AT36, AT37-37SL-38-39, AT40
- Battleford Road – AT44, AT46
- Bracknagh Road – AT48B
- Killylea Road – AT53
- Cormeen Road – AT55, AT56
- Unclassified Road – AT57-58, AT58SL, AT59-60
- Ballyhoy Road – AT61
- Unclassified Road – AT62SL
- Monaghan Road spur – AT62-63, AT64
- Brootally Road – AT66
- Dernalea Road – AT68A, AT68B, AT69, AT70, AT71-71SL1
- Maddan Road – AT73
- Sheetrim Road – AT85
- Drumhillery Road – AT85SL, AT87A
- Tivnacree Road – AT87B, AT88
- Glassdrummond Road – AT92
- Fergort Road – AT95
- Unclassified Road – AT96
- Derrynoose Road – AT101
- Crossbane Road – ATOS

It should be noted that for accesses located at the end of lanes i.e. AT32B, AT59-60, AT61, AT62-63, AT64 and AT71-71SL1, that no AutoTrack assessment has been undertaken as all vehicle movements would be possible due to road alignment.

4.8.5 Summary

Overall the traffic volumes required to be accommodated by the roads under consideration are low and have a temporary nature i.e. only for a limited number of days. The section above has indicated both the background traffic and the development traffic flows are low and within the estimated link capacity. In addition it should be noted if two vehicles meet on roads that are too narrow for two vehicles to pass each other there are currently numerous informal passing opportunities that allow these manoeuvres to take place.

4.9 Mitigation

4.9.1 Turleenan Substation

4.9.1.1 Access Arrangements

As stated previously, there is an existing dwelling (No. 152 Trewmount Road) located within the confines of the development site. The development proposals involve initially allowing the dwelling to remain during the construction phase (to be used as a site

office), with a temporary access located to the northern edge of the site, as shown in Figure 2. Once the majority of the construction work is completed, it is intended to demolish the dwelling and locate the permanent access to the site in this location. Figure 3 shows the proposed permanent access location.

Annex 5 includes a Technical Note describing the calculation of the sightline requirements on the basis of a traffic speed survey and in accordance with DCAN 15 standards. For both temporary and permanent accesses at Turleenan Substation it is proposed to provide 15 metres radii and 4.5 x 168.3metres sightlines, which are compliant with DCAN15.

The permanent access road will be 10 metres wide for the first 20 metres from the priority road to allow vehicles to pass each other safely, reducing to a 6 metres wide road for the remaining distance to the substation.

4.9.1.2 Traffic Management

In terms of traffic management for the proposed substation, haul routes will be designated for construction traffic. Haulage routes will make use of A and B roads.

During construction, traffic movements will be limited during construction to a maximum of 200 vehicle movements per day (2 way movements) and all parking associated with the development will occur within the development site. Due to volume of spoil to be removed off site, wheel cleaning facilities will be provided for relevant vehicles.

4.9.2 Overhead Line and Towers

The following sections detail the proposed enhancement / mitigation measures proposed for the 59 accesses identified in Section 4.8.4.

4.9.2.1 Mitigation Measurement 1 – Traffic Management at the Site Access

A total of 27 accesses require traffic management at the site access. Traffic management measures include either enforcement of restricted construction traffic movements at the access e.g. left in, right out, or 'shuttle running' traffic management on the adjoining road as follows:

Traffic Management - Restricted Movements at the Site Access

There are 17No. in total including:

- Benburb Road – AT20
- Drumlee Road – AT24-25
- Clonfeacle Road – AT29
- Tullyneagh Road – AT43
- Bracknagh Road – AT48A, AT49
- Navan Fort Road – AT51
- Killylea Road – AT54
- Brootally Road – AT65, AT67
- Dernalea Road – AT71SL2, AT72
- Maddan Road – AT74SL2
- Sheetrim Road – AT80
- Tivnacree Road – AT89, AT90
- Unclassified Road – AT93-94

Traffic Management – 'Shuttle Running' on Adjoining Road at Site Access

There are 10No. in total including:

- Culkeeran Road – AT10
- Benburb Road – AT26
- Artasooly Road – AT33, AT35

- Battleford Road – AT45
- Bracknagh Road – AT47
- Hanslough Road – AT76
- Drumhillery Road – AT86
- Doohat Road – AT99
- Derrynoose Road – AT100

Annex 10 includes a typical layout showing the 'shuttle running' traffic management measures proposed for the 10 accesses detailed above.

4.9.2.2 Mitigation Measurement 2 – Access Widening Required

A total of 20 accesses require widening to facilitate the required construction vehicle manoeuvres:

- Rhone Road – AT13
- Culrevog Road – AT18 and AT19
- Artasooly Road – AT34
- Tullysaran Road – AT41A, AT41B-42
- Bracknagh Road – AT50
- Navan Fort Road – AT52, AT52SL
- Maddan Road – AT74SL1A
- Cavanagarvan Road – AT77-78A, AT77-78B, AT79
- Sheetrim Road – AT81, AT82, AT83A, AT83B, AT84,
- Glasdrummond Road – AT91

4.9.2.3 Mitigation Measurement 3 – Traffic Management required en route to access from feeder road.

A total of 5 accesses require traffic management en route:

- Derrygally Way – AT2
- Rhone Road – AT14
- Tullydowey Road – AT31-32A, AT32B
- Maddan Road – AT74SL1B

4.9.2.4 Mitigation Measurement 4 – Traffic Management required at access and also en route to access from feeder road.

A total of 2 accesses require traffic management en route:

- Unclassified Road – AT75 (restricted traffic movements at access)
- Listrakelt Road – AT97

4.9.2.5 Mitigation Measurement 5 – Widening required at access and Traffic Management required en route

A total of 5 accesses require widening at the access and traffic management en route:

- Major Lane – AT7
- Tullydowey Road – AT30
- Unclassified Road – AT74
- Unclassified Road – AT102A (restricted movements at access), AT102B (restricted movements at access)

4.9.2.6 Summary

All 104 temporary access points required for the construction of the overhead line and towers have been assessed using AutoTrack to ascertain whether the existing geometries of the accesses can facilitate all the required construction vehicle

manoeuvres on and off the adjoining road. A total of 45 accesses have been identified which can facilitate all the required movements. The remainder of the accesses (59) require the following mitigation measures:

- **Mitigation Measure 1 - Traffic Management at the Site Access** – 17No. have restricted movements at the site access and 10No. require 'shuttle running' traffic management.
- **Mitigation Measure 2 - Access Widening** – 20No. require widening to accommodate the required construction vehicles
- **Mitigation Measure 3 - Traffic Management En Route from Feeder Road** – 5No. accesses
- **Mitigation Measure 4 - Traffic Management Measures required at Access and En Route from Feeder Road** – 2No. accesses
- **Mitigation Measure 5 - Access Widening and Traffic Management En Route from Feeder Road** - 5No. accesses

Annex 10 includes drawings showing the mitigation measures proposed for the accesses requiring widening and also a typical layout showing the 'shuttle running' traffic management measures proposed.

For the junctions requiring widening the drawings include sight lines, radii, and swept path analysis showing a JCB Fastrac vehicle with a trailer (the most onerous turning movement expected) and designed in accordance with standards in Development Control Advice Note 15 (DCAN 15) Vehicular Access Standards.

With regard to the accesses requiring traffic management measures to be deployed en route, the detail of the traffic management would be agreed as part of the Construction Traffic Management Plan. An outline plan has been produced at this stage (see Section 4.12), the detail of which (within the parameters set by the outline plan) would be agreed by the contractor with Roads Service prior to construction. Options include one way systems or use of traffic control over stretches of the road, e.g. use of stop/go boards.

It should be noted that if it is determined by the Planning Service on advice by Roads Service that temporary traffic measures are not to be used, existing accesses could be temporarily enlarged to accommodate the larger types of construction vehicles. In this case, all construction vehicles could enter the proposed sites and make deliveries off the public road network without requiring traffic management at the site access. The area required for the temporarily enlarging the existing accesses has been identified and included within the planning application boundary. On the basis of the Department's determination, where the accesses are to be widened, vegetation will be cleared (where applicable) and any affected services and drainage will be amended to ensure normal operation during the construction phase and replacement vegetation will be planted after the construction phase along with stock proof fencing, where required.

4.10 Parking

Throughout the construction phase construction staff will not be allowed to park on the public highways. To further minimise staff vehicles, all staff will travel to/from the construction sites in mini-buses.

Once operational the proposed substation will have a total of 6 no. parking spaces. The maximum generated traffic at the substation is never likely to require parking in excess of this number of spaces.

In summary there will be no parking impacts caused by the Proposed Development on the surrounding road network.

4.11 Road Pavements and Below Pavement Infrastructure

A Maintenance Plan for the works will be developed that will incorporate a monitoring and maintenance strategy for the haul routes associated with the scheme. This will focus primarily on unclassified roads and to a lesser extent on the class B roads. As the impact on class A roads is negligible in comparison with normal traffic volumes, regular liaison with Road Service should suffice.

The overall Construction Traffic Management Plan (CTMP) for the works will ensure that construction vehicle haul routes follow the hierarchal (top down) approach to site access, i.e. the largest portion of the route will be on A roads, then B roads and only using unclassified roads for short stretches. The plan will be prepared in three stages:

- Design Stage (by designer in consultation with Road Service)
- Construction Stage (enhanced by contractor in consultation with Road Service)
- Post Construction and Maintenance Stage (post construction monitoring by design team, contractor and Road Service)

The Maintenance Plan should follow a pre agreed format which was outlined in previously submitted reports (extracted below).

4.11.1 Overview

A maintenance plan will be developed and agreed with Roads Service at Design Stage and incorporated into the Stage 1 CTMP for the assessment and maintenance of the public highway and associated infrastructure. The contractor will adopt and develop this strategy in liaison with Roads Service through the course of the works ensuring its implementation and incorporation in to the construction stage CTMP.

4.11.2 Baseline Assessment

The strategy will likely commence, prior to construction, with a form of initial visual assessment of the proposed road network backed up with photographic records to determine a baseline condition survey. A grading will be applied. This will then be developed into an agreed format and included in the CTMP as an addendum report. The strategy will also include prevention and repair strategy should the baseline condition of the existing public highway fall by more than an agreed grade point average.

4.11.3 Prevention of Damage to the Public Highway

Where construction or delivery vehicles, required to complete the works, are considered to impact on the public highway (where applicable to be agreed with Roads Service), mitigation measures will be developed to ensure the risk of damage is minimised.

A clear procedure will also be established and incorporated into the CTMP to ensure that areas of the public highway utilised through the construction period will be kept clear of debris and any damage caused by, or directly related to, construction activities will be reported and repaired within a pre-agreed timescale.

4.11.4 Repairs to Damage to Roadways

The agreed haul routes on Class and Unclassified Road (C/UC) used by construction and delivery vehicles will be monitored on a regular basis by Road Service and the Contracting Team. All damage will be reported immediately. This will ensure that the damage can be assessed and the cause established without delay.

All damage to these haul routes, which can be attributed to the construction activities associated with the works, will be repaired to an agreed standard within a pre agreed timescale. This obligation will be written into any bond agreement required with the overseeing authority prior to commencement of the works and clearly presented in the CTMP

The stage 1 CTMP will make this obligation clear to the selected contractor during the tender process. A clear record of all repairs carried out will be kept on file and placed in the CTMP and safety file following completion of the works for future reference and supplied to Road Service.

4.12 Construction Traffic Management Plan

Prior to construction, a Construction Traffic Management Plan would be prepared and submitted to Roads Service following consultation with other stakeholders such as the Police Service of Northern Ireland. An outline plan has been drawn up at this stage; see Annex 11. However, the appointed contractor would finalise this traffic management plan (within the parameters set by the outline plan) with Roads Service and adhere to its detail during the construction of the line. This plan would include the following:

- If required, appropriate Police or contractor escort to accompany movement of components to be agreed with the Roads Service and Police where appropriate;
- Advanced notification to the general public warning of transport movements;
- Informative road signage warning other users of forthcoming construction traffic movements;
- Arrangement for regular road maintenance and cleaning, e.g. road sweeping in the vicinity of the site access point as necessary;
- In order to reduce traffic and parking impacts, construction personnel would be required to travel to the construction sites in mini-buses / staff work van type vehicles.
- Wheel cleaning/dirt control arrangements at key stages of constructions; and
- Provision of temporary signs and traffic control where necessary.

4.13 Conclusions

4.13.1 Turleenan Substation

The construction and operational phases of the Turleenan Substation have been shown to generate traffic impacts of less than the threshold value of 10% for detailed assessment and therefore no further work in this regard is required.

Two accesses are proposed as part of the development, a temporary access for construction and a permanent one once operational. Both accesses are located off Trewmount Road and have been designed to be compliant with DCAN 15 with regard to layout and sightlines.

All parking associated with construction traffic can be accommodated within the construction site and once operational 6No. parking spaces will be provided for staff and/or visitors, which will more than adequately cater for the demand. Therefore no extraneous parking associated with this part of the development is anticipated.

Furthermore a Construction Traffic Management Plan will be implemented to designate haul routes to and from the substation and manage daily movement to and from the site to be less than 200 vehicle movements per day (two-way).

4.13.2 Overhead Line and Towers

The overhead line and towers will require the use of a total of 104 temporary access points. Existing accesses i.e. field gates and laneways have been identified as the preferred access points in order to minimise the impacts and disruption of providing new accesses.

NIE intends to instruct the contractor to provide two construction teams for the towers aspect of the development, at this point estimated to complete towers 1-51 and 52-102 respectively. Due to the scale of the development i.e. over an approx. 34km length, interaction between the two teams is not anticipated, as the first team approaches tower 51 for construction, the second team will be approaching tower 102 for construction. This working methodology will be actioned through a construction traffic management plan. Therefore, the cumulative effect of the two teams working at the same time in terms of traffic on particular roads on the network is removed.

The Construction Traffic Management Plan would also specify the haul routes for each tower access to negate impacts on unsuitable roads.

Traffic impacts of more than the threshold value of 10% for further assessment have been identified at 25 locations on the affected network. Further analysis of the affected roads has been undertaken with regard to link capacities, flow increases per hour and identification of the existing informal passing opportunities. Overall the traffic volumes required to be accommodated by the roads under consideration are low and have a temporary nature i.e. only for a limited number of days. In all cases the background traffic and the development traffic flows are low and within the estimated link capacities.

All proposed accesses have been analysed with AutoTrack, with the 'worst case' construction vehicle type i.e. Fastrac and 8 metres long trailer. A number of accesses (45) can facilitate the vehicle manoeuvres with their existing geometries/layout. The remainder will require traffic management measures to allow the use of the accesses as they stand, either at the access or en route to the access on the adjoining roads (where existing road widths are lower than 4 metres wide).

If it is determined by the Planning Service on advice by Roads Service that temporary traffic measures are not to be used, where possible existing accesses could be temporarily enlarged to accommodate the larger types of construction vehicles. In this case, all construction vehicles could enter the proposed sites and make deliveries off the public road network without requiring traffic management at the site access.

Where the accesses are to be widened, vegetation will be cleared (where applicable) and any affected services and drainage will be amended to ensure normal operation during the construction phase. After construction should the temporary enlargement of existing accesses be required, replacement vegetation will be planted after the construction phase along with stock proof fencing, where required.

In addition, and prior to construction, a Construction Traffic Management Plan for construction related traffic would be prepared and submitted to Roads Service for consideration.

5 Summary and Conclusions

5 Summary and Conclusions

5.1 Key Points

This report has examined the transport impacts of the proposed Tyrone Cavan Interconnector, with the key points as follows:

Development Proposals

- The Proposed Development consists of a new substation at Turleenan, outside Moy, County Tyrone and the construction of approximately 34km of 400kv overhead line from the source substation to the Tyrone and Cavan county border, where it will tie into the Electricity Supply Board network (Republic of Ireland).
- The proposed substation will commence construction in 2015 and take 3 years to complete in 2017. The access proposals include a temporary access for construction and also a permanent access once operational. Both accesses are located off Trewmount Road B106.
- The overhead line will require the construction of 102 No. towers through the use of 104No. temporary accesses which have been identified by NIE through extensive on site survey recognisance work. Where possible existing field gates and laneways have been used on the premise that if they are already being used by farm machinery they would more likely also be suitable for the type of construction vehicles proposed as part of the development proposals.
- It is intended to use NIE's existing depot at Carn Industrial Estate, Craigavon as the depot for the construction of the proposed development.
- During construction the site working hours will be restricted to 07:00 – 19:00 or hours of daylight Monday to Friday. Saturday working hours will be restricted to 07:00-13:00 or hours of daylight. No Sunday or night working except for emergency works (pumping of excavations, not construction).
- NIE intends to instruct the contractor to provide two construction teams for the overhead line and towers, at this point estimated to complete towers 1-51 and 52-102 respectively.

Development Traffic Generation

- The substation traffic flows are estimated to have a peak daily flow of 200 vehicles per day during the construction phase (2015-2017) and 2 vehicles per day during the operational phase.
- The majority of the temporary accesses used for the construction of the overhead line and towers would be used for between 15 and 19 construction days in total. The maximum daily traffic flow would be less than 60 vehicles per day. Average daily trip generation range between 9 and 25 trips per day. Once construction of the overhead line is complete, access for maintenance will occur every two years by foot or by a single 4x4 vehicle using existing field gates and laneways.
- Largest vehicles used for construction would be a Fastrac vehicle with 8 metre long trailer, 8 cubic metre concrete lorry and tipper trucks for stone deliveries.
- Staff would be required to travel to the development sites in mini-buses/work van vehicles, originating from Carn Industrial Estate.
- Due to the particular location and nature of the proposals public transport services, facilities for pedestrians and cyclists and alternative travel modes are limited.

Traffic Impacts

- Traffic count information for those roads likely to be temporarily impacted by the development was obtained from surveys undertaken in November 2012 and January 2013. The base year was assumed to be 2013.
- Historical traffic growth has shown negative growth on the local network. To provide a robust assessment NRTF low growth has been used to forecast background traffic growth.
- Following traffic surveys and analysis of current traffic conditions on the adjoining road, the morning AM and evening PM peak hours were found to be 08:00-09:00 and 17:00-18:00 respectively.
- The 10% threshold for detailed traffic impact analysis has been adopted in this assessment, as there is no existing congestion on the surrounding road network.
- Traffic impacts of the proposed substation are less than the 10% threshold during the construction phase (2015-2017). They are also less than 10% in year of opening, 2017 and design year, 2027.
- Traffic impact analysis of the construction of the overhead line and towers has shown that there are 25 locations whereby the traffic impacts would be over 10%. However, the traffic impacts would only be during the construction phase and therefore are a temporary effect of the development. Those roads which experience a temporary increase of greater than 10%, have been

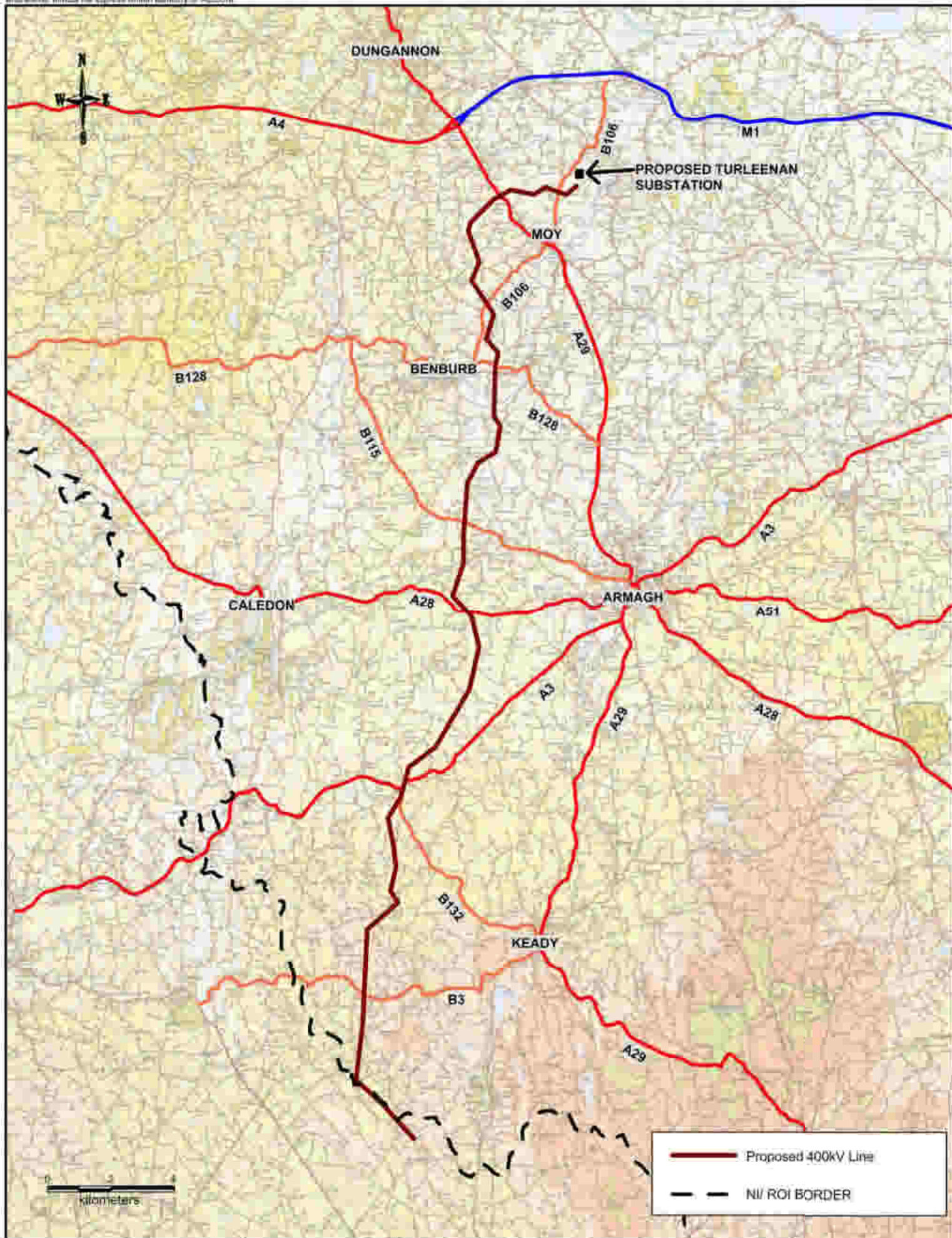
shown to have the operational capacity to accommodate the additional temporary traffic associated with the construction of the towers.

Access Assessments

- Analysis shows that 45 temporary access points used to construct the overhead line and towers can use existing gate entrances as their dimensions are suffice to accommodate the required vehicle types.
- Mitigation measures are proposed for 59 of the temporary accesses used to construct the overhead line and towers. Measures include the implementation of traffic management measures at the access or en route from the nearest feeder road and/or junction widening.
- Haul routes have been designated as far as possible at this stage until a contractor is appointed and suppliers identified. On this basis haul routes to/from quarries, concrete supplier and landfills can only be assessed so far as the route from the nearest A or B class road to the development sites, the impacts beyond this are unlikely to be significant.
- An outline Construction Traffic Management Plan has been produced with the detail to be agreed by the contractor (within the parameters set within the outline plan) with Roads Service prior to construction.
- Should it be required (on the basis of the determination of the Department), all existing accesses could be temporarily enlarged to accommodate the larger types of construction vehicles, so that no traffic management at the access points is required and the accesses are in line with standards in DCAN 15.

A separate Environmental Impact Assessment (EIA) and Statement has being prepared for this Proposed Development.

Figures



Client	NIE
Project	TYRONE - CAVAN INTERCONNECTOR

Title	STUDY AREA
-------	------------

AECOM

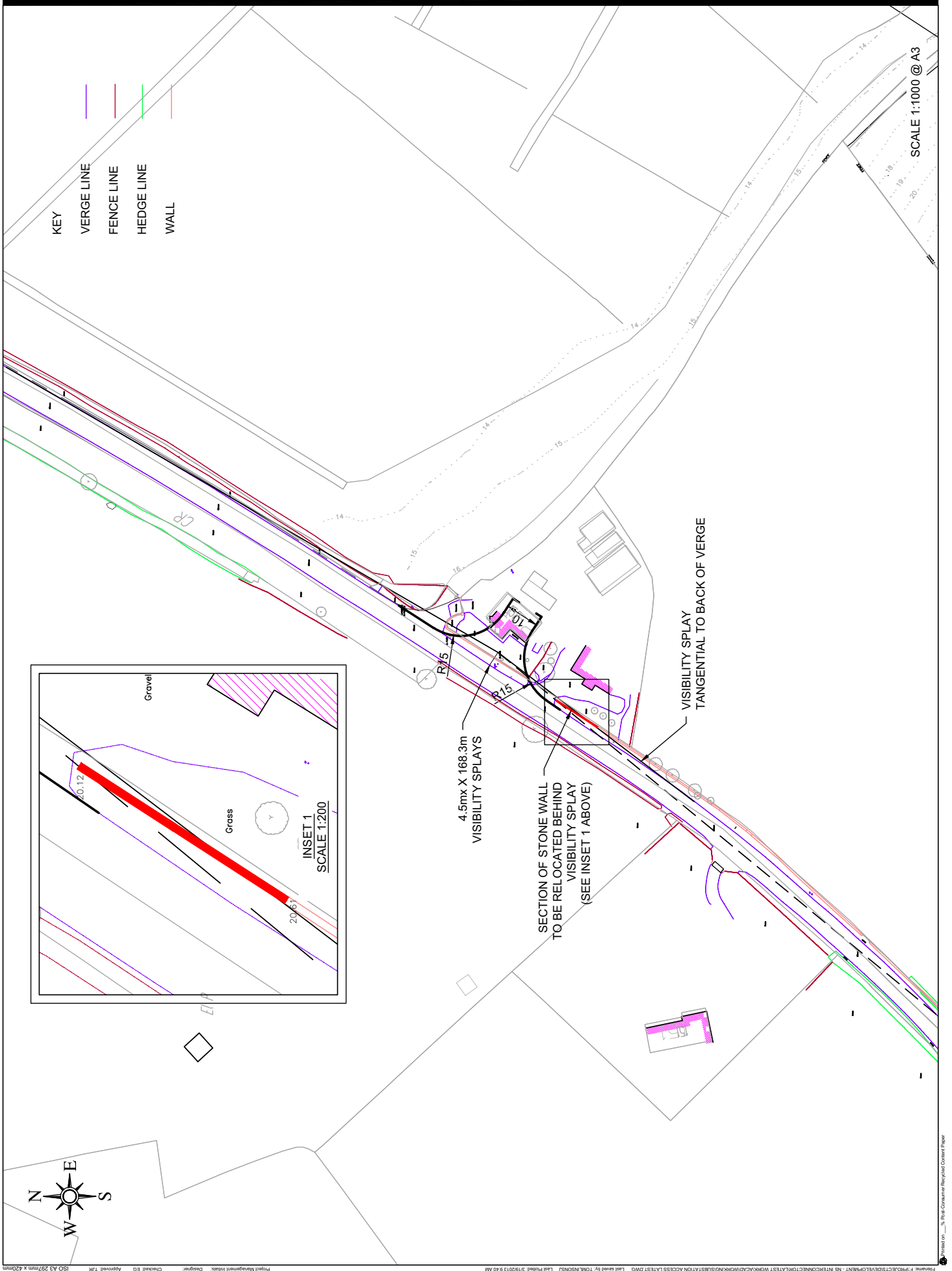
8th Floor
The Clarence West Building
2 Clarence Street West
BELFAST BT2 7QP

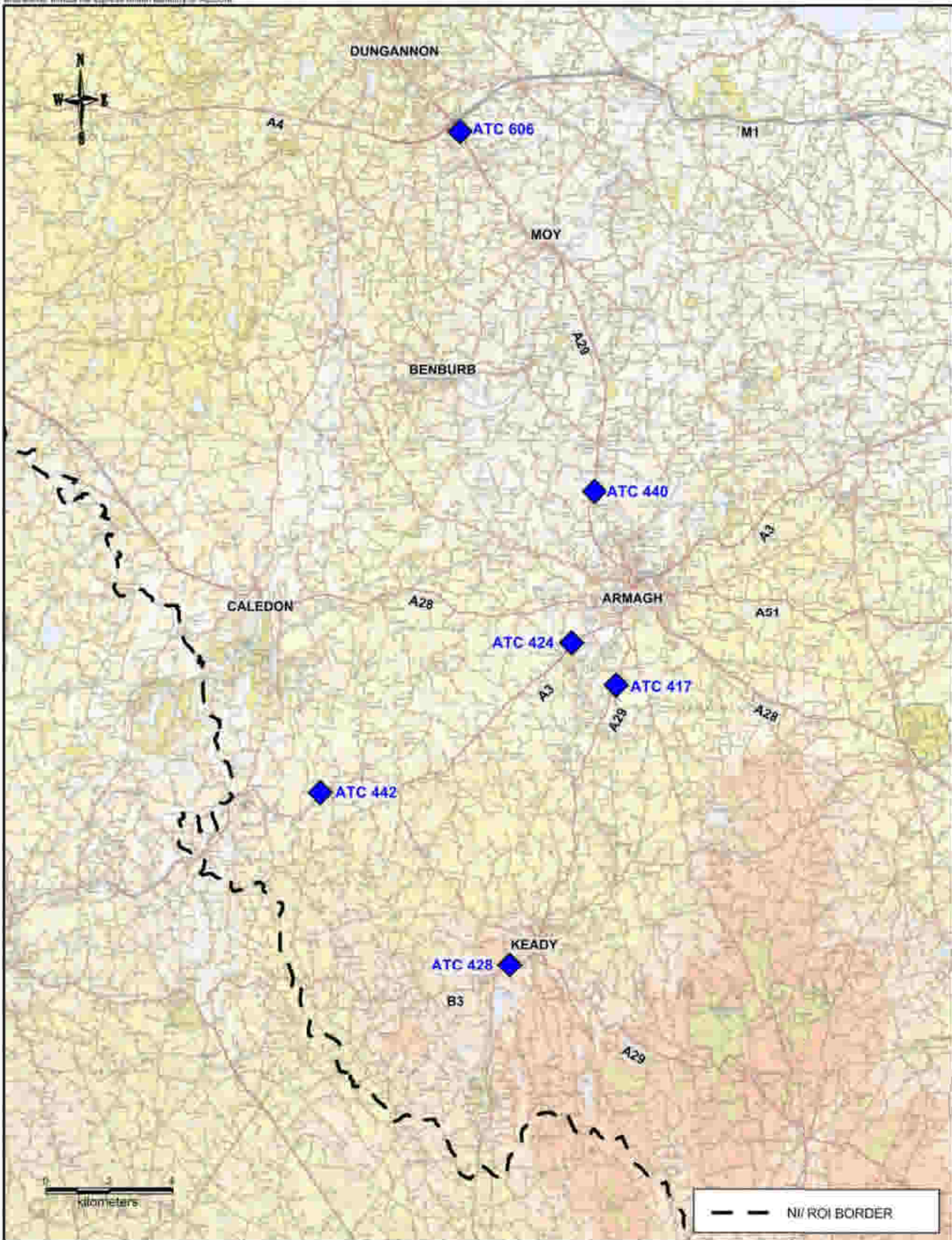
Tel: +44 (0) 28 9060 7000
Fax: +44 (0) 28 9060 7069
www.AECOM.com

Design	PC	MapInfo	PC
Client	EG	Appr	TJR
Date	MARCH 2013	Scale	1:150,000
No.	FIGURE 1		

TYRONE CAVAN INTERCONNECTOR

SUBSTATION PERMANENT ACCESS
VISIBILITY SPLAYS - FIGURE 3

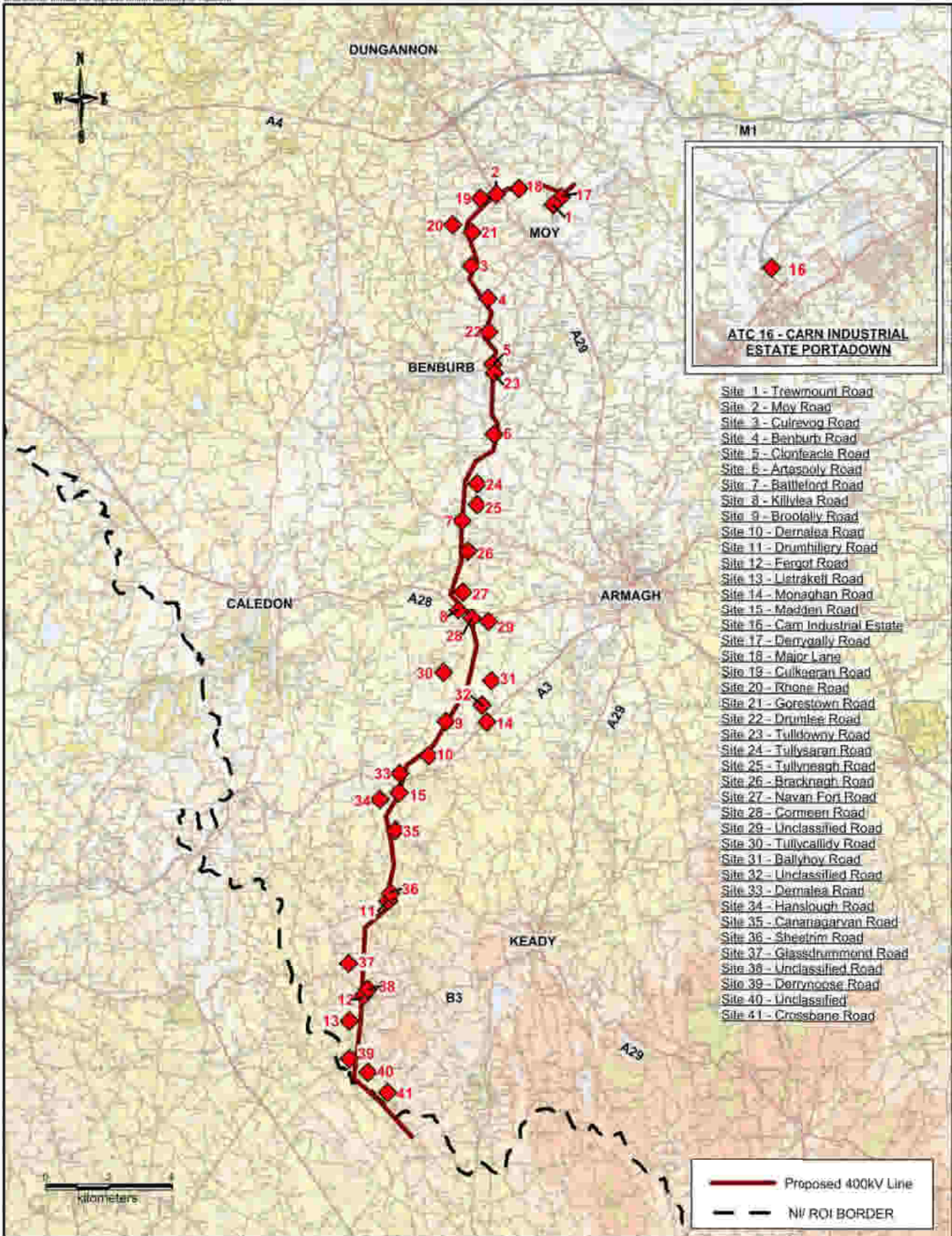




--- NI/ROI BORDER

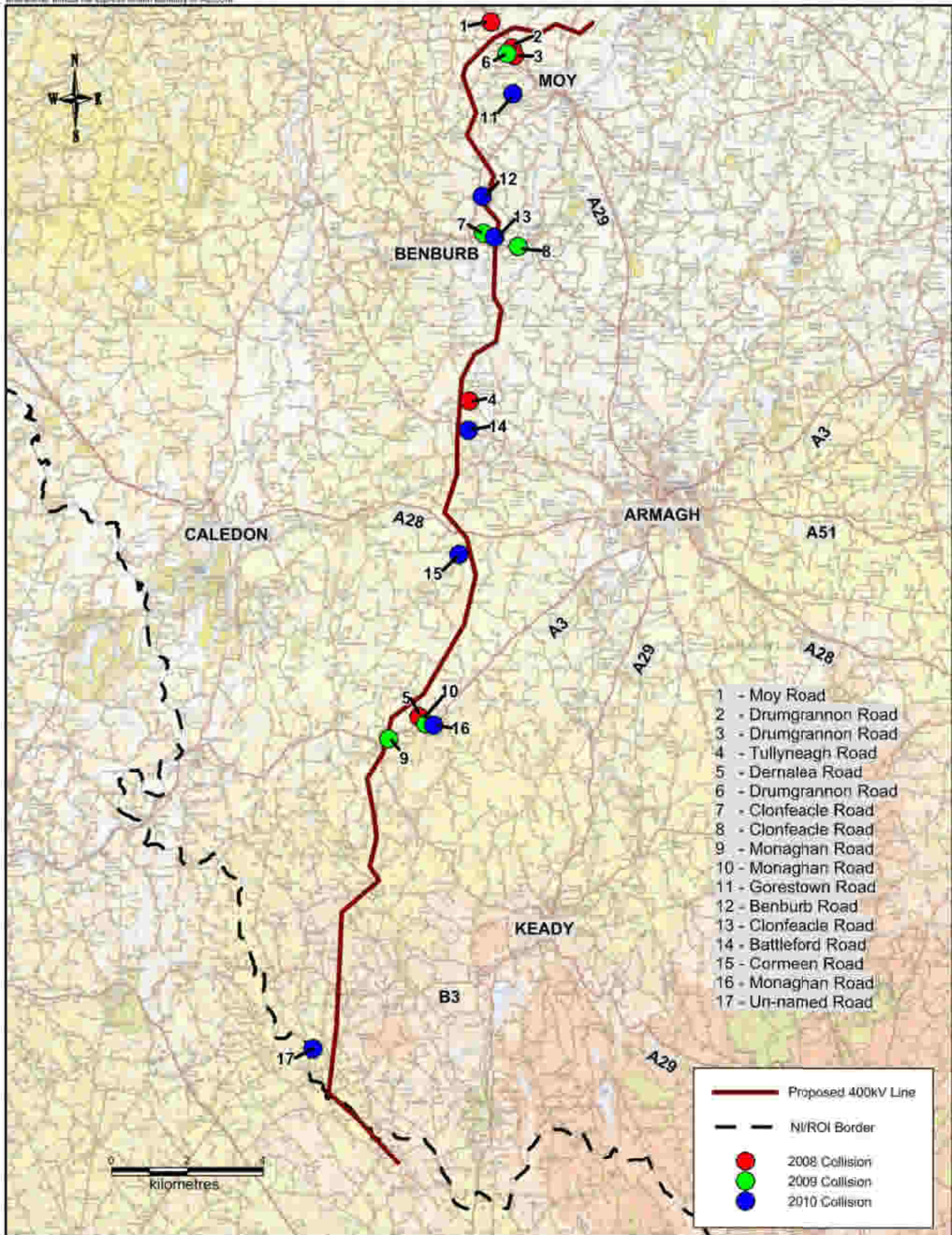
Client	NIE	Title	LOCATION OF PERMANENT ROADS SERVICE COUNTERS			Design	PC	Mapinfo	PC
Project	TYRONE - CAVAN INTERCONNECTOR					Client	EG	Appd	TJR
						Date	MARCH 2013	Scale	1:150,000
						No.	FIGURE 4		

8th Floor
The Clarence West Building
3 Clarence Street West
BELFAST BT2 7QP
Tel: +44 (0) 28 9060 7000
Fax: +44 (0) 28 9060 7069
www.AECOM.com



- Site 1 - Trewmount Road
- Site 2 - Moy Road
- Site 3 - Culrevog Road
- Site 4 - Benburb Road
- Site 5 - Clonfeacle Road
- Site 6 - Artespuly Road
- Site 7 - Balleford Road
- Site 8 - Killylea Road
- Site 9 - Brootally Road
- Site 10 - Derralea Road
- Site 11 - Drumhillery Road
- Site 12 - Fergot Road
- Site 13 - Uetrakeli Road
- Site 14 - Monaghan Road
- Site 15 - Madden Road
- Site 16 - Carn Industrial Estate
- Site 17 - Derrygally Road
- Site 18 - Major Lane
- Site 19 - Cullkeeran Road
- Site 20 - Rrone Road
- Site 21 - Gorestown Road
- Site 22 - Drumlee Road
- Site 23 - Tullidowny Road
- Site 24 - Tullysaran Road
- Site 25 - Tullyneagh Road
- Site 26 - Bracknagh Road
- Site 27 - Navan Fort Road
- Site 28 - Cormeen Road
- Site 29 - Unclassified Road
- Site 30 - Tullycallidy Road
- Site 31 - Ballyhoy Road
- Site 32 - Unclassified Road
- Site 33 - Derralea Road
- Site 34 - Hanslough Road
- Site 35 - Cananagarvan Road
- Site 36 - Sheehin Road
- Site 37 - Glassdrummond Road
- Site 38 - Unclassified Road
- Site 39 - Derrynoose Road
- Site 40 - Unclassified
- Site 41 - Crossbane Road

Client	NIE	Title	LOCATION OF AECOM ATC SURVEYS		Design	PC	MapInfo	PC
Project	TYRONE - CAVAN INTERCONNECTOR				Client	EG	Appr	TJR
				8th Floor The Clarence West Building 2 Clarence Street West BELFAST BT2 7QP	Date	MARCH 2013	Scale	1:150,000
				Tel: +44 (0) 28 9060 7000 Fax: +44 (0) 28 9060 3599 www.AECOM.com	No.	FIGURE 5		



Client	NIE
Project	TYRONE - CAVAN INTERCONNECTOR

Title	2008 - 2010 COLLISION HISTORY WITHIN STUDY AREA
-------	---

AECOM

3rd Floor
The Clarence West Building
2 Clarence Street West
BELFAST BT1 2DP

Tel: +44 (0) 28 9060 7000
Fax: +44 (0) 28 9060 3599
www.AECOM.com

Design	PC	Info/Info	PC
Client	EG	Appr	TJR
Date	MARCH 2013	Scale	1:125,000
No.	FIGURE 6		



Client	NIE
Project	TYRONE - CAVAN INTERCONNECTOR

Title	PROPOSED NIE DEPOT AT CARN INDUSTRIAL ESTATE, PORTADOWN
-------	---

AECOM

AECOM (UK) Ltd
The Gateway, Westbury
2, Clarendon Street, West
Bath, BA1 1RN, UK






Tel: +44 (0) 1225 818272
Fax: +44 (0) 1225 808273
www.aecom.com

Design	PC	Map/Info	PC
Client	EG	Author	TJR
Date	MARCH '13	Scale	1:10,000
No.			

Annexes

Annex 1 – Overhead Line and Towers Access Summary

ACCESS PHOTOS

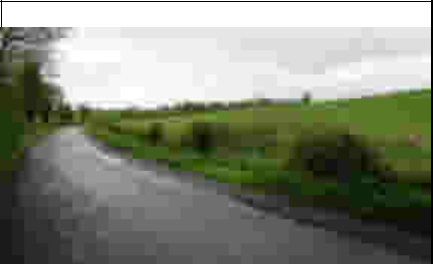
ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT1	1	T1 & Turleenan Sub-Station	Trewmount Road		Existing
AT2	1	T2	Derrygally Way		Existing
AT3-4-5-6	4	T3, T4, T5 & T6	Trewmount Road		Existing
AT7	1	T7	Major Lane		Existing
AT8-9	2	T8 & T9	Moy Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT10	1	T10	Culkeeran Road		Existing
AT11	1	T11	Culkeeran Road		Existing
AT12	1	T12	Culkeeran Road		Existing
AT13	1	T13	Rhone Road		Existing
AT14	1	T14	Rhone Road		Existing



ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT15	1	T15	Gorestown Road		Existing
AT16-17	2	T16, T17	Culrevog Road		Existing
AT18	1	T18	Culrevog Road		Existing
AT19	1	T19	Culrevog Road		Existing
AT20	1	T20	Benburb Road		Existing


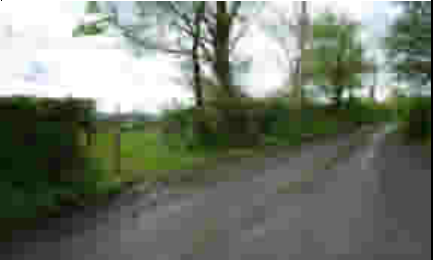


ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT21	1	T21	Benburb Road		Existing
AT22-23	2	T22 & T23	Benburb Road		Existing
AT24-25	2	T24 & T25	Drumlee Road		Existing
AT23SL	0	N/A	Drumlee Road		Existing
AT26	1	T26	Benburb Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT27-28	2	T27 & T28	Drumlee Road		Existing
AT29	1	T29	Clonfeacle Road		Existing
AT30	1	T30	Tullydowey Road		Existing
AT31-32A	2	T31 & T32	Tullydowey Road		Existing
AT32B	1	T32	Tullydowey Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT33	1	T33	Artasooly Road		Existing
AT33SL	0	N/A	Artasooly Road		
AT34	1	T34	Artasooly Road		Existing
AT35	1	T35	Artasooly Road		Existing
AT36	1	T36	Artasooly Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT37-37SL-38-39	3	T37, T38 & T39	Artasooly Road		Existing
AT40	1	T40	Tullysaran Road		Existing
AT41B-42	2	T41 & T42	Tullysaran Road		Existing
AT43	1	T43	Tullyneagh Road		Yes
AT44	1	T44	Battleford Road		Existing


ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT45	1	T45	Battleford Road		Existing
AT46	1	T46	Battleford Road		Existing
AT47	1	T47	Bracknagh Road		Existing
AT48A	1	T48	Bracknagh Road		Existing
AT48B					Existing




ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT49-49SL	1	T49			Existing
AT50	1	T50	Bracknagh Road		Existing
AT51	1	T51	Navan Fort Road		Existing
AT52	1	T52	Navan Fort Road		Existing
AT52SL	0	N/A	Navan Fort Road		

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT53	1	T53	Killylea Road		Existing
AT54	1	T54	Killylea Road		Existing
AT55	1	T55	Cormeen Road		New
AT56	1	T56	Cormeen Road		Existing
AT57-58	2	T57 & T58	No name		Existing




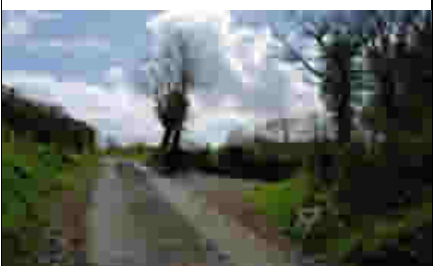
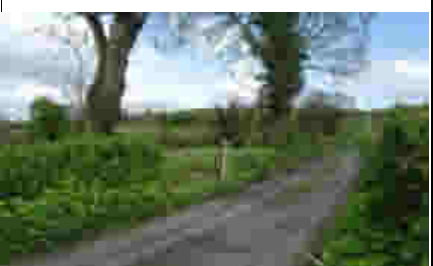
ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT58SL	0	N/A	No name		
AT59-60	2	T59 & T60	No name		
AT61	1	T61	Ballyhoy Road		Existing
AT62-63	2	T62 & T63	Monaghan Road		Existing
AT62SL	1	T62	Tullycallidy Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT64	1	T64	Monaghan Road		Existing
AT65	1	T65	Brootally Road		Existing
AT66	1	T66	Brootally Road		Existing
AT67	1	T67	Brootally Road		Existing
AT68A	1	T68	Dernalea Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT68B	1	T68	Dernalea Road		Existing
AT69	1	T69	Dernalea Road		Existing
AT70	1	T70	Dernalea Road		Existing
AT71-71SL1	1	T71	No name	Road Temporarily Closed During Site Visit - No Picture Available	Existing
AT71SL2	0	N/A	Dernalea Road		Existing


ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT72	1	T72	Dernalea Road		Existing
AT73	1	T73	Maddan Road		Existing
AT74	1	T74	No name		
AT74SL1A	0	N/A	Maddan Road		New
AT74SL1B	0	N/A	No name		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT74SL2	0	N/A	Maddan Road		Existing
AT75	1	T75	No name		Existing
AT76	1	T76	Hanslough Road		Existing
AT78A	1	T77-78	Cavanagarvan Road		Existing
AT78B	2	T78 & T79	Cavanagarvan Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT79	1	T79	Cavanagarvan Road		Existing
AT80	1	T80	Sheetrim Road		Existing
AT81	1	T81	Sheetrim Road		Existing
AT82	1	T82	Sheetrim Road		Existing
AT83A	1	T83	Sheetrim Road		Existing

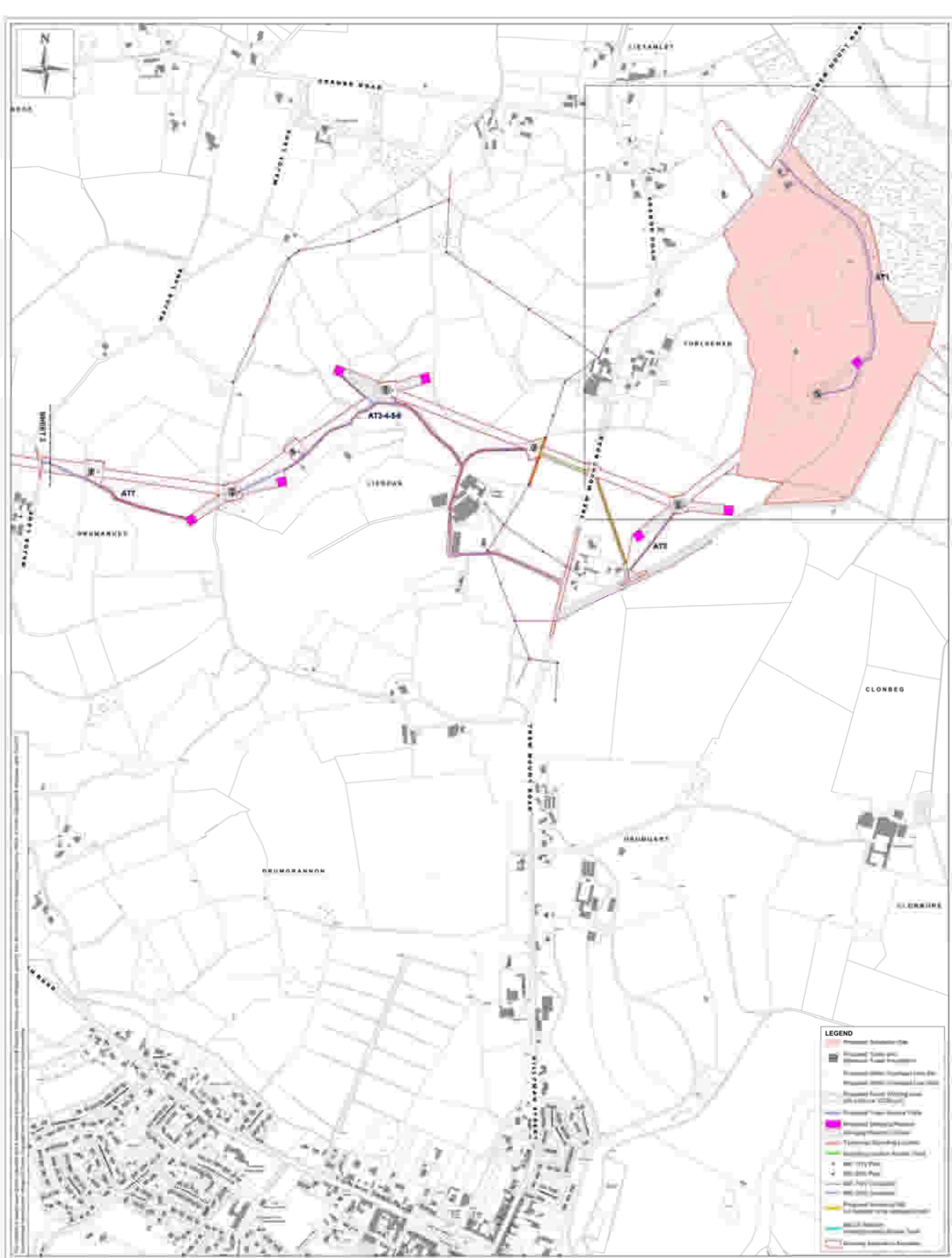
ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT83B	1	T83	Sheetrim Road		Existing
AT84	2	T84	Sheetrim Road		Existing
AT85	1	T85	Sheetrim Road		Existing
AT85SL	0	N/A	Drumhillery Road		Existing
AT86	1	T86	Drumhillery Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT87A	1	T87	Drumhillery Road		Existing
AT87B			Tivnacree Road		Existing
AT88	1	T88	Tivnacree Road		Existing
AT89	1	T89	Tivnacree Road		Existing
AT90	1	T90	Tivnacree Road		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT91	1	T91	Glassdrummond Road		Existing
AT92	1	T92	Glassdrummond Road		Existing
AT93-94	2	T93 & T94	No name		Existing
AT95	1	T95	Fergort Road		Existing
AT96	1	T96	No name		Existing

ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT97	1	T97	Listrakelt Road		Existing
AT98	1	T98	Listrakelt Road		Existing
AT99	1	T99	Derrynoose Road		Existing
AT100	1	T100	Derrynoose Road		Existing
AT101	1	T101	Derrynoose Road		Existing

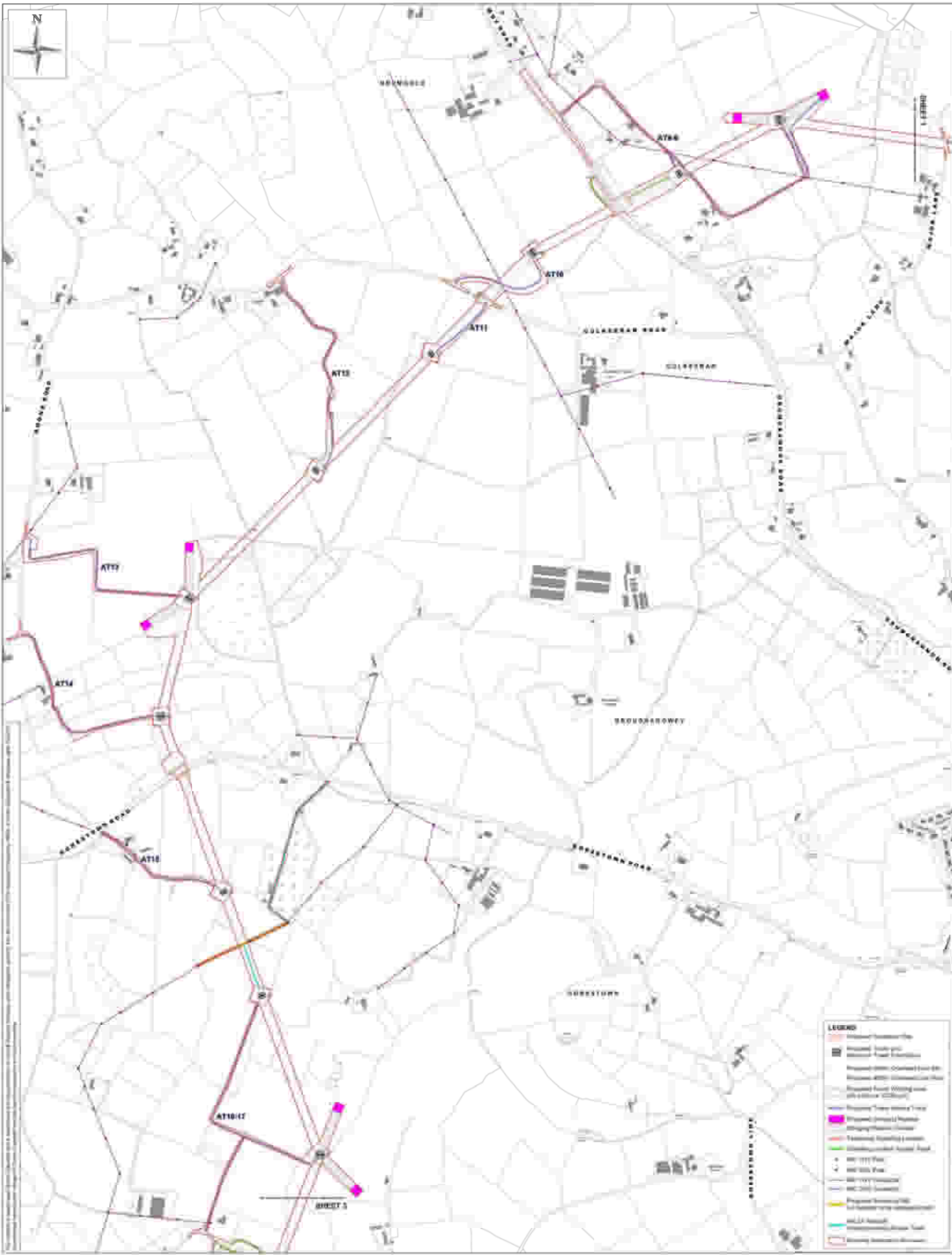
ACCESS REF.	TOTAL TOWERS ACCESSED	TOWER NO.'S	ADJOINING ROAD		ACCESS
			ROAD NAME	PHOTO	
AT102A	1	T102	No name		Existing
AT102B	1	T102	No name		Existing
ATOS	-	-	Crossbane Road		Existing



LEGEND

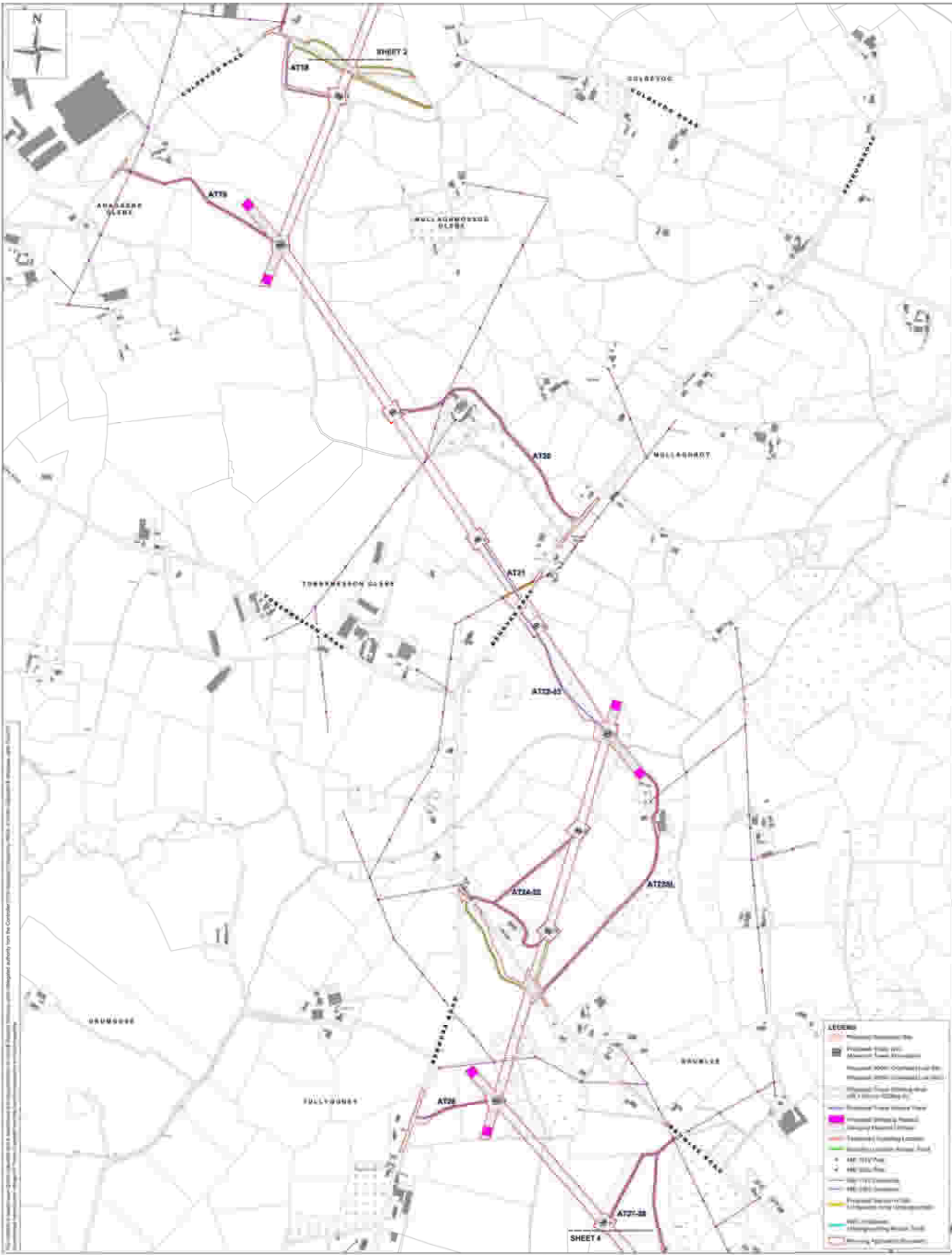
- Proposed Interconnector
- Proposed 110kV Line
- Proposed 400V Line
- Proposed Watercourse
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)
- Proposed Watercourse (Watercourse)

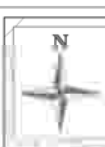
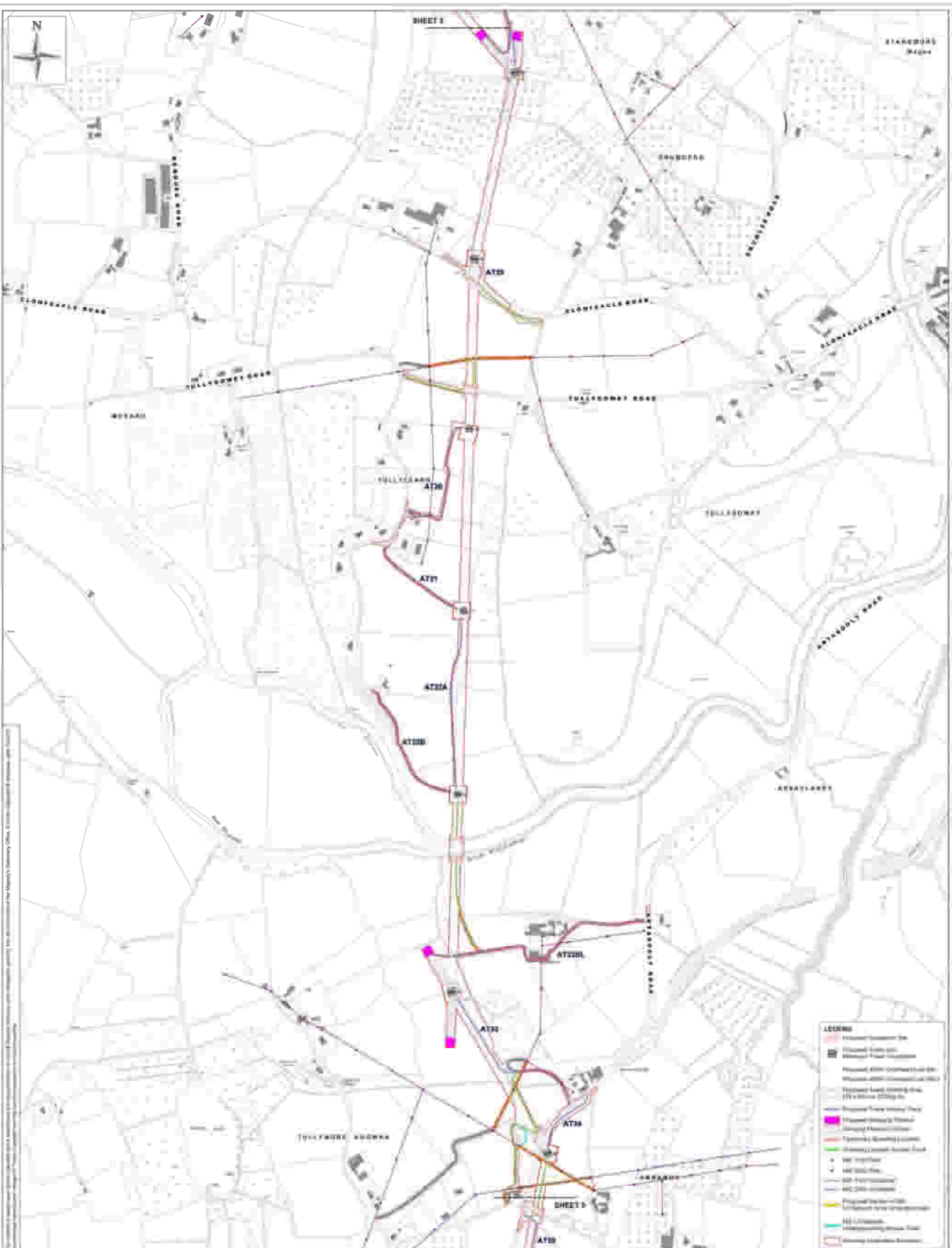




LEGEND

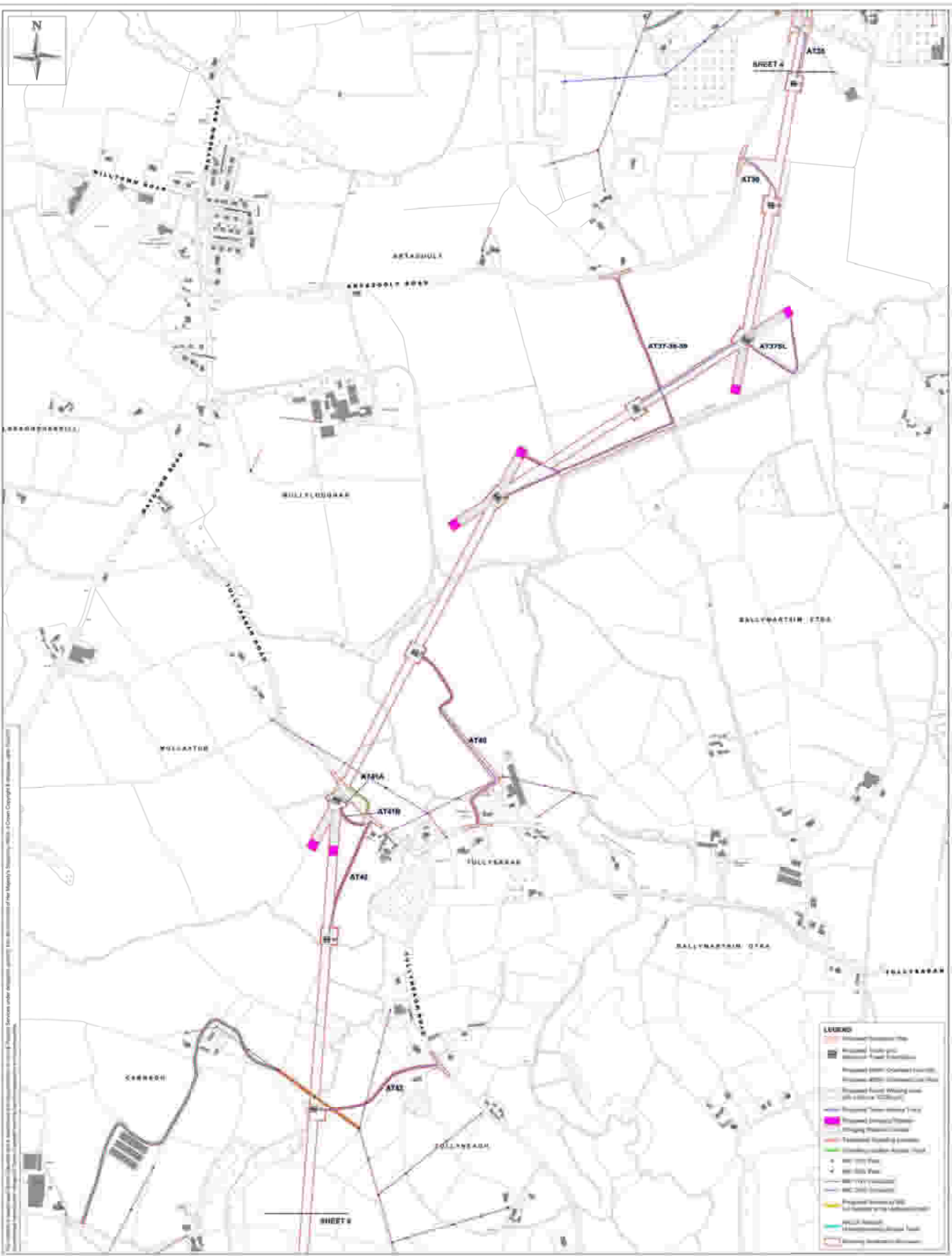
- Proposed 400kV Line
- Proposed 400kV Line (Overhead)
- Proposed 400kV Line (Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)
- Proposed 400kV Line (Overhead/Underground)

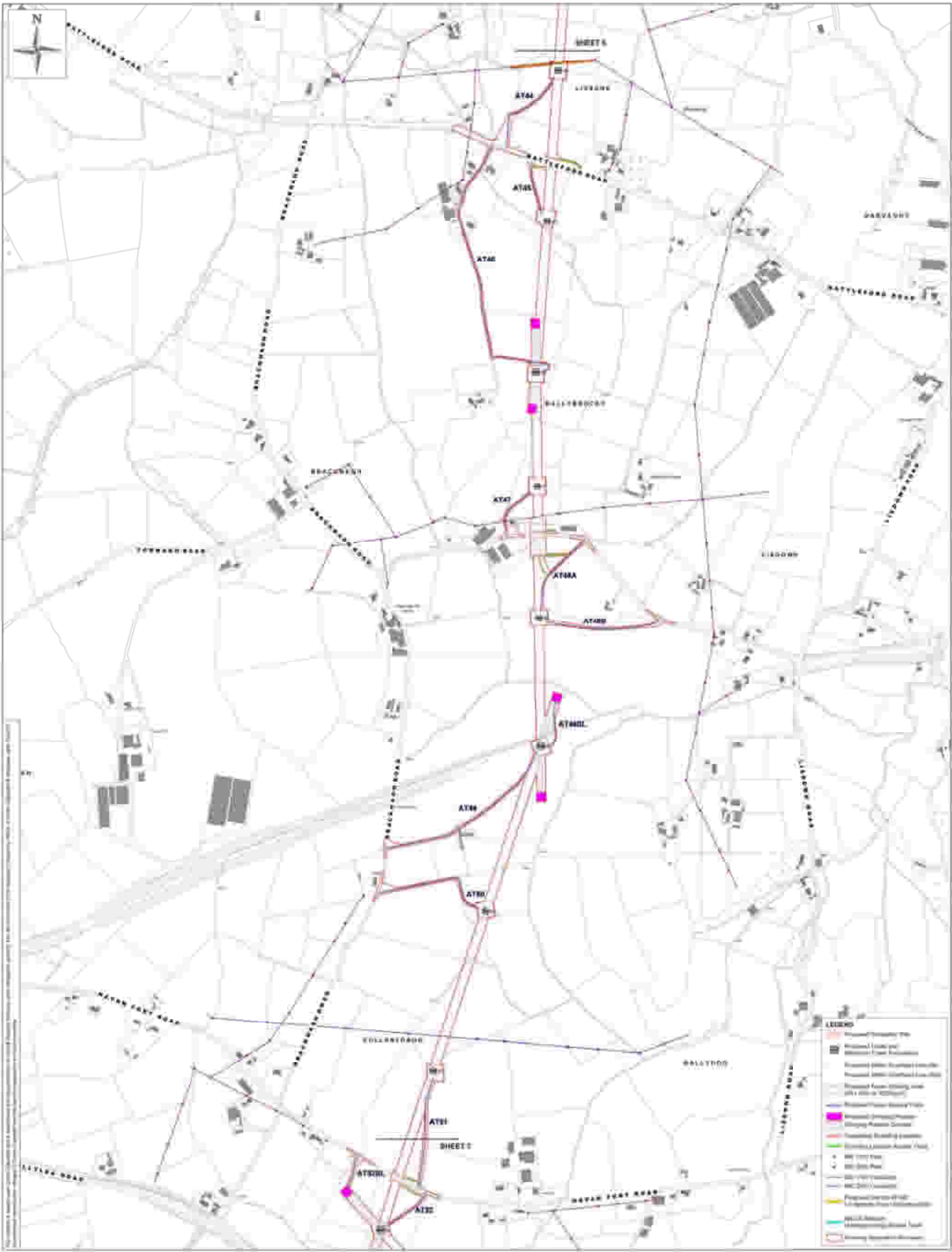


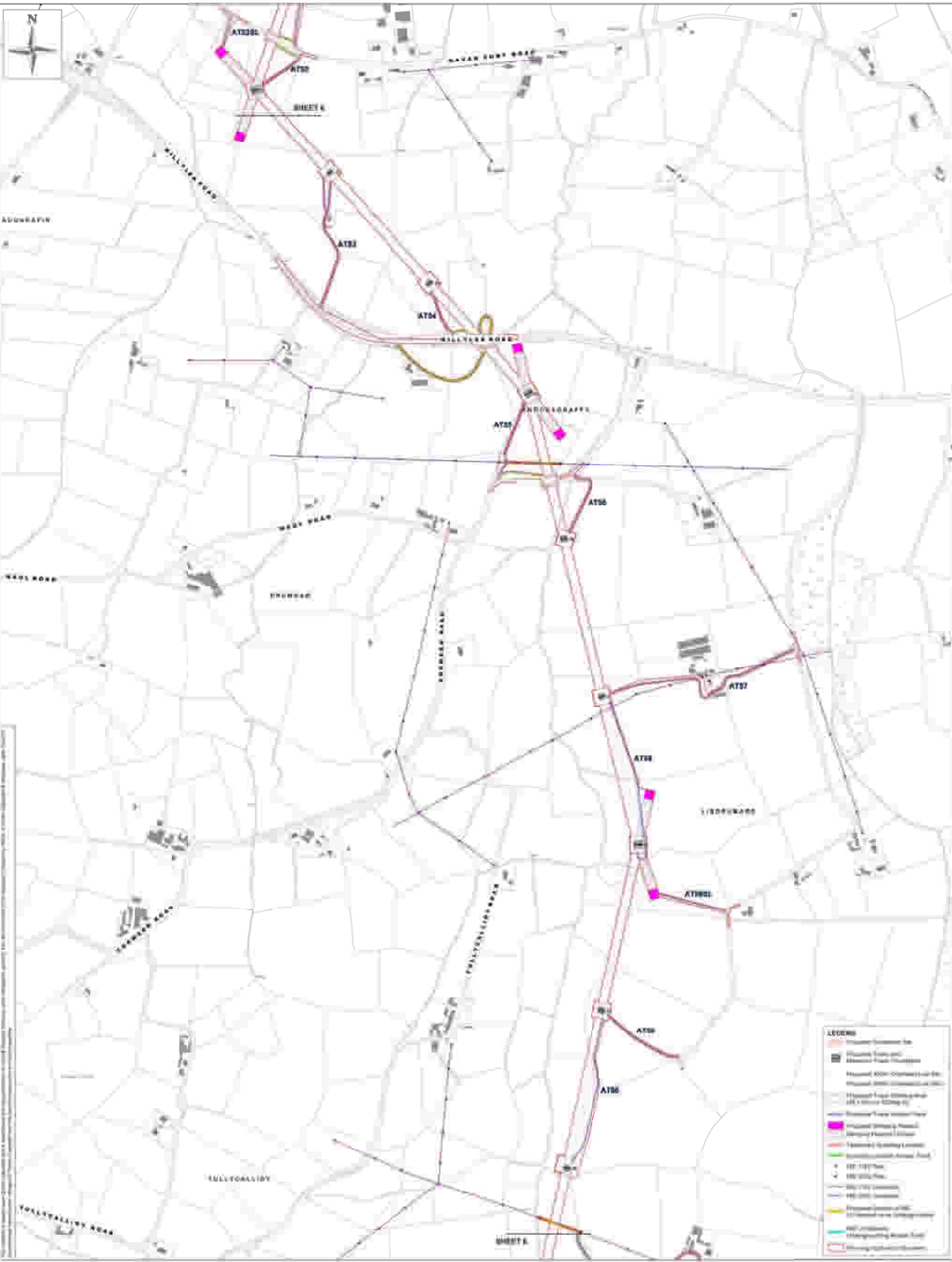


LEGEND

- Proposed 400kV Line
- Proposed 220kV Line
- Proposed 110kV Line
- Proposed 33kV Line
- Proposed 10kV Line
- Proposed 400kV Substation
- Proposed 220kV Substation
- Proposed 110kV Substation
- Proposed 33kV Substation
- Proposed 10kV Substation
- Proposed 400kV Tower
- Proposed 220kV Tower
- Proposed 110kV Tower
- Proposed 33kV Tower
- Proposed 10kV Tower
- Proposed 400kV Pole
- Proposed 220kV Pole
- Proposed 110kV Pole
- Proposed 33kV Pole
- Proposed 10kV Pole
- Proposed 400kV Cable
- Proposed 220kV Cable
- Proposed 110kV Cable
- Proposed 33kV Cable
- Proposed 10kV Cable
- Proposed 400kV Conductor
- Proposed 220kV Conductor
- Proposed 110kV Conductor
- Proposed 33kV Conductor
- Proposed 10kV Conductor
- Proposed 400kV Insulator
- Proposed 220kV Insulator
- Proposed 110kV Insulator
- Proposed 33kV Insulator
- Proposed 10kV Insulator
- Proposed 400kV Tower Footing
- Proposed 220kV Tower Footing
- Proposed 110kV Tower Footing
- Proposed 33kV Tower Footing
- Proposed 10kV Tower Footing
- Proposed 400kV Pole Footing
- Proposed 220kV Pole Footing
- Proposed 110kV Pole Footing
- Proposed 33kV Pole Footing
- Proposed 10kV Pole Footing
- Proposed 400kV Cable Footing
- Proposed 220kV Cable Footing
- Proposed 110kV Cable Footing
- Proposed 33kV Cable Footing
- Proposed 10kV Cable Footing
- Proposed 400kV Conductor Footing
- Proposed 220kV Conductor Footing
- Proposed 110kV Conductor Footing
- Proposed 33kV Conductor Footing
- Proposed 10kV Conductor Footing
- Proposed 400kV Insulator Footing
- Proposed 220kV Insulator Footing
- Proposed 110kV Insulator Footing
- Proposed 33kV Insulator Footing
- Proposed 10kV Insulator Footing
- Proposed 400kV Tower Footing
- Proposed 220kV Tower Footing
- Proposed 110kV Tower Footing
- Proposed 33kV Tower Footing
- Proposed 10kV Tower Footing
- Proposed 400kV Pole Footing
- Proposed 220kV Pole Footing
- Proposed 110kV Pole Footing
- Proposed 33kV Pole Footing
- Proposed 10kV Pole Footing
- Proposed 400kV Cable Footing
- Proposed 220kV Cable Footing
- Proposed 110kV Cable Footing
- Proposed 33kV Cable Footing
- Proposed 10kV Cable Footing
- Proposed 400kV Conductor Footing
- Proposed 220kV Conductor Footing
- Proposed 110kV Conductor Footing
- Proposed 33kV Conductor Footing
- Proposed 10kV Conductor Footing
- Proposed 400kV Insulator Footing
- Proposed 220kV Insulator Footing
- Proposed 110kV Insulator Footing
- Proposed 33kV Insulator Footing
- Proposed 10kV Insulator Footing



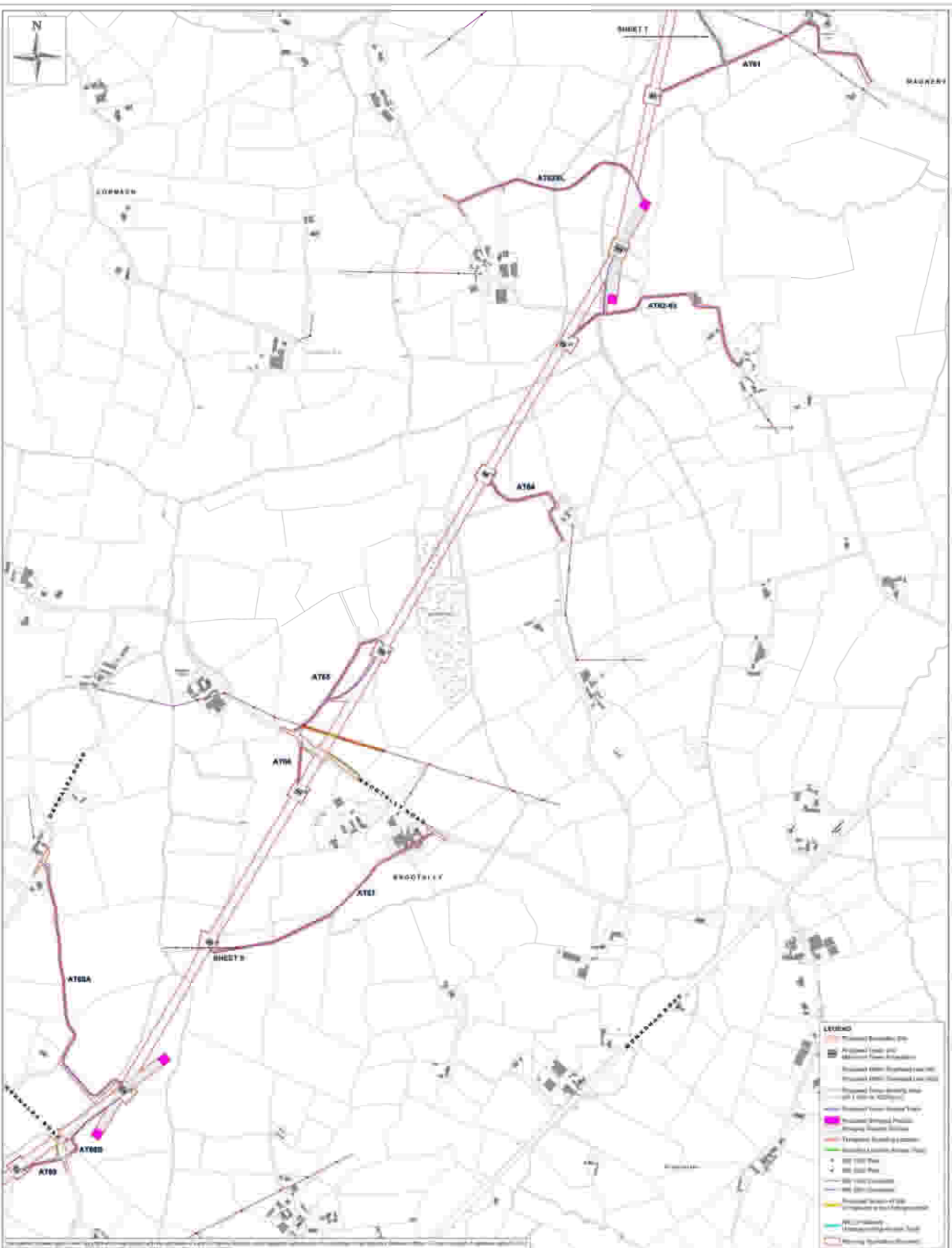




LEGEND

- Proposed 400kV Interconnector
- Existing 400kV Interconnector
- Proposed 220kV Interconnector
- Existing 220kV Interconnector
- Proposed 110kV Interconnector
- Existing 110kV Interconnector
- Proposed 33kV Interconnector
- Existing 33kV Interconnector
- Proposed 10kV Interconnector
- Existing 10kV Interconnector
- Proposed 0.4kV Interconnector
- Existing 0.4kV Interconnector
- Proposed 110kV Overhead
- Existing 110kV Overhead
- Proposed 220kV Overhead
- Existing 220kV Overhead
- Proposed 33kV Overhead
- Existing 33kV Overhead
- Proposed 10kV Overhead
- Existing 10kV Overhead
- Proposed 0.4kV Overhead
- Existing 0.4kV Overhead
- Proposed 110kV Cable
- Existing 110kV Cable
- Proposed 220kV Cable
- Existing 220kV Cable
- Proposed 33kV Cable
- Existing 33kV Cable
- Proposed 10kV Cable
- Existing 10kV Cable
- Proposed 0.4kV Cable
- Existing 0.4kV Cable
- Proposed 110kV Underground
- Existing 110kV Underground
- Proposed 220kV Underground
- Existing 220kV Underground
- Proposed 33kV Underground
- Existing 33kV Underground
- Proposed 10kV Underground
- Existing 10kV Underground
- Proposed 0.4kV Underground
- Existing 0.4kV Underground
- Proposed 110kV Cable
- Existing 110kV Cable
- Proposed 220kV Cable
- Existing 220kV Cable
- Proposed 33kV Cable
- Existing 33kV Cable
- Proposed 10kV Cable
- Existing 10kV Cable
- Proposed 0.4kV Cable
- Existing 0.4kV Cable

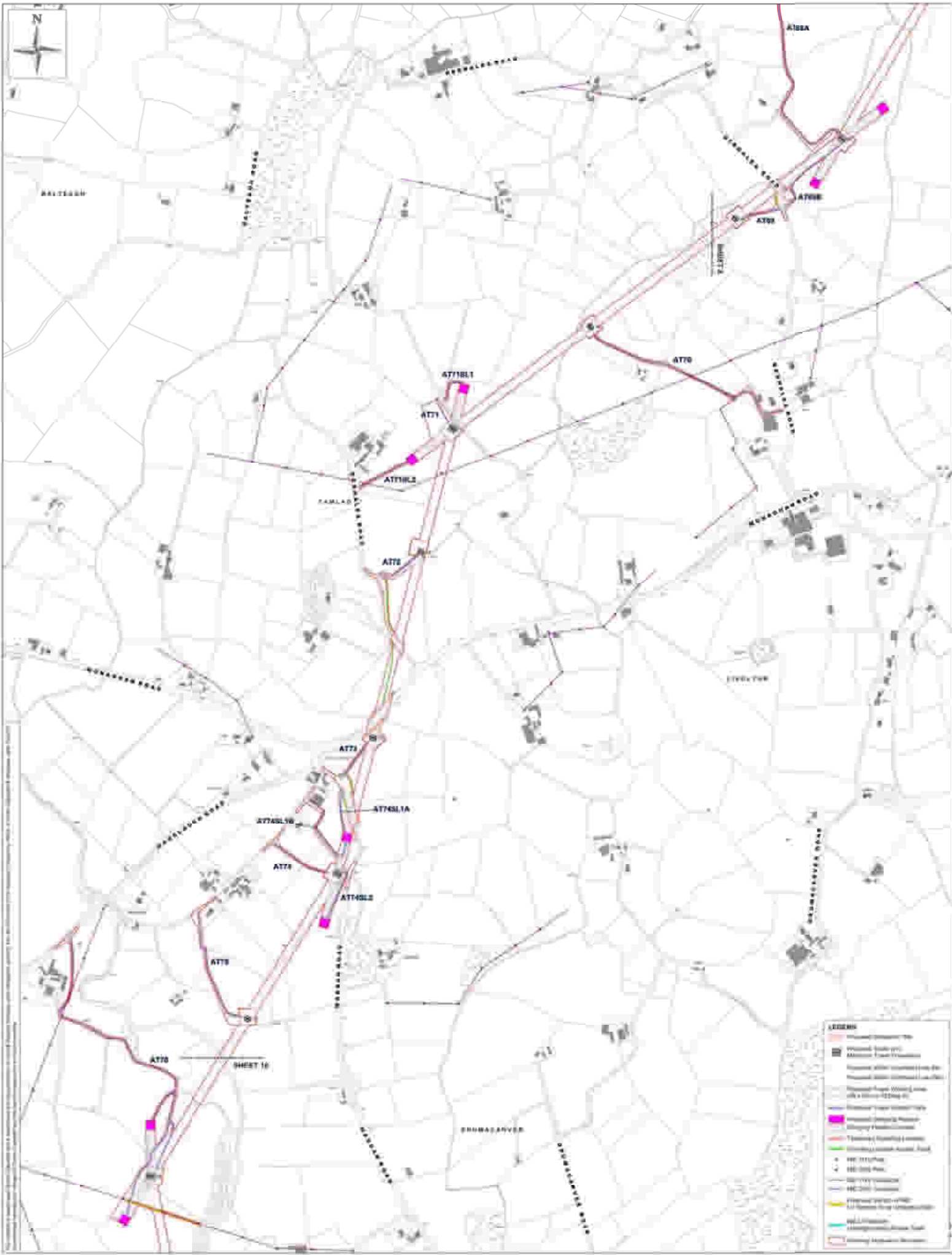


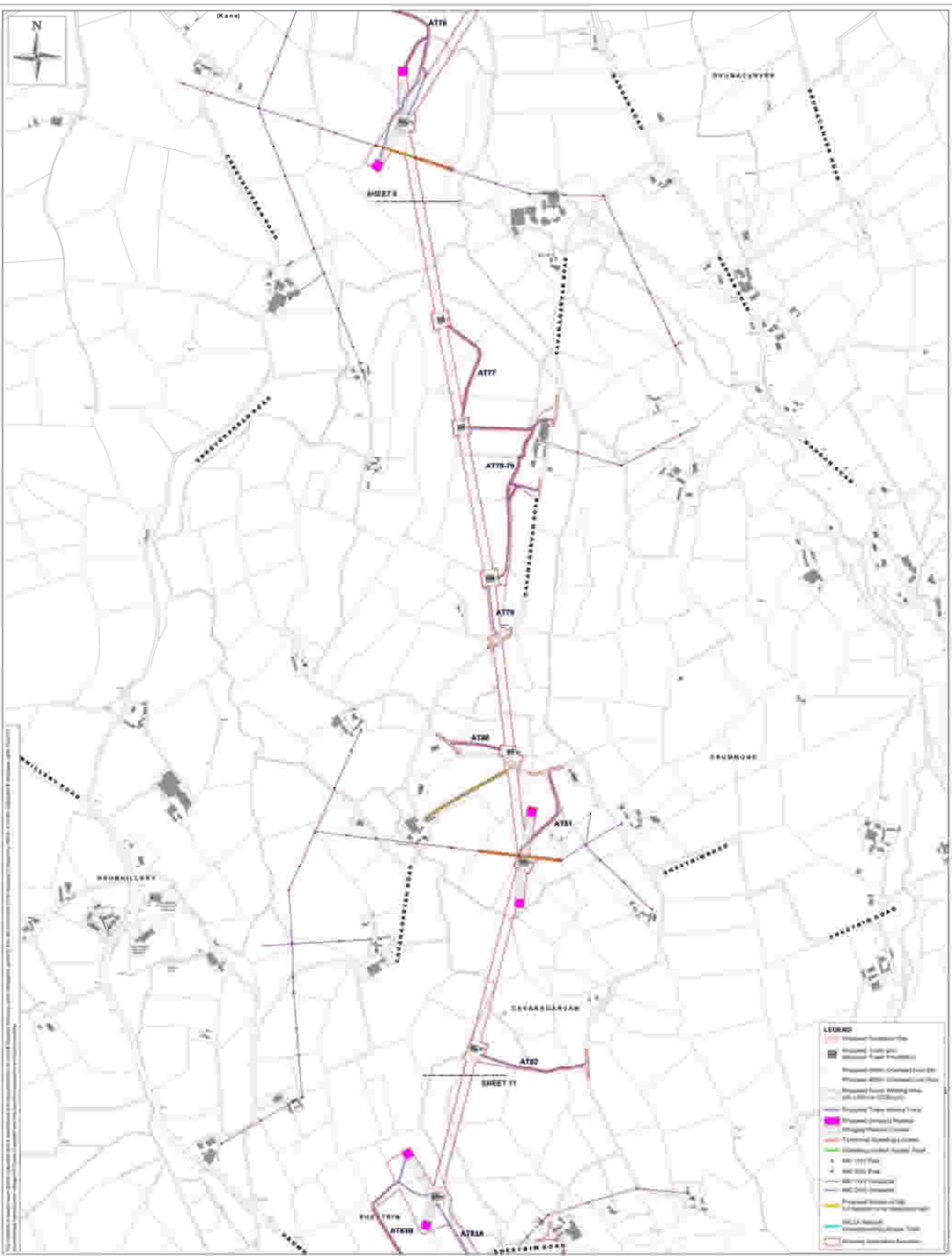


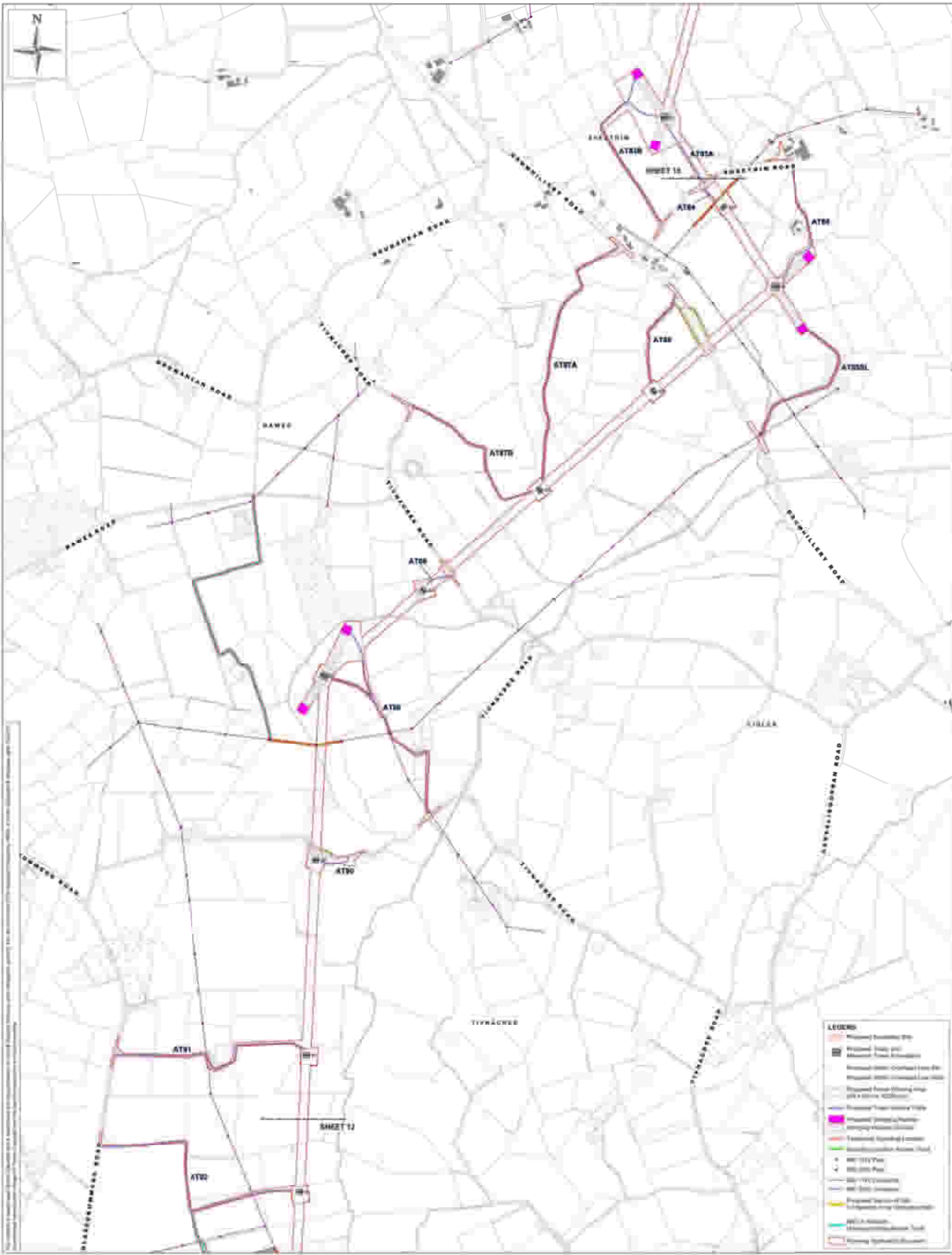
ANNEX 1
 TYRONE TO CAVAN
 400kV INTERCONNECTOR PROJECT
 ASSOCIATED WORKS SITE LOCATION PLAN
 SHEET 8 OF 13



Design: MH	Drawn: GB
Check: NIE	App'd: NIE
Date: 14/10/2013	Scale: 1:20,000 @ A3
No: ANNEX 1 - 08	

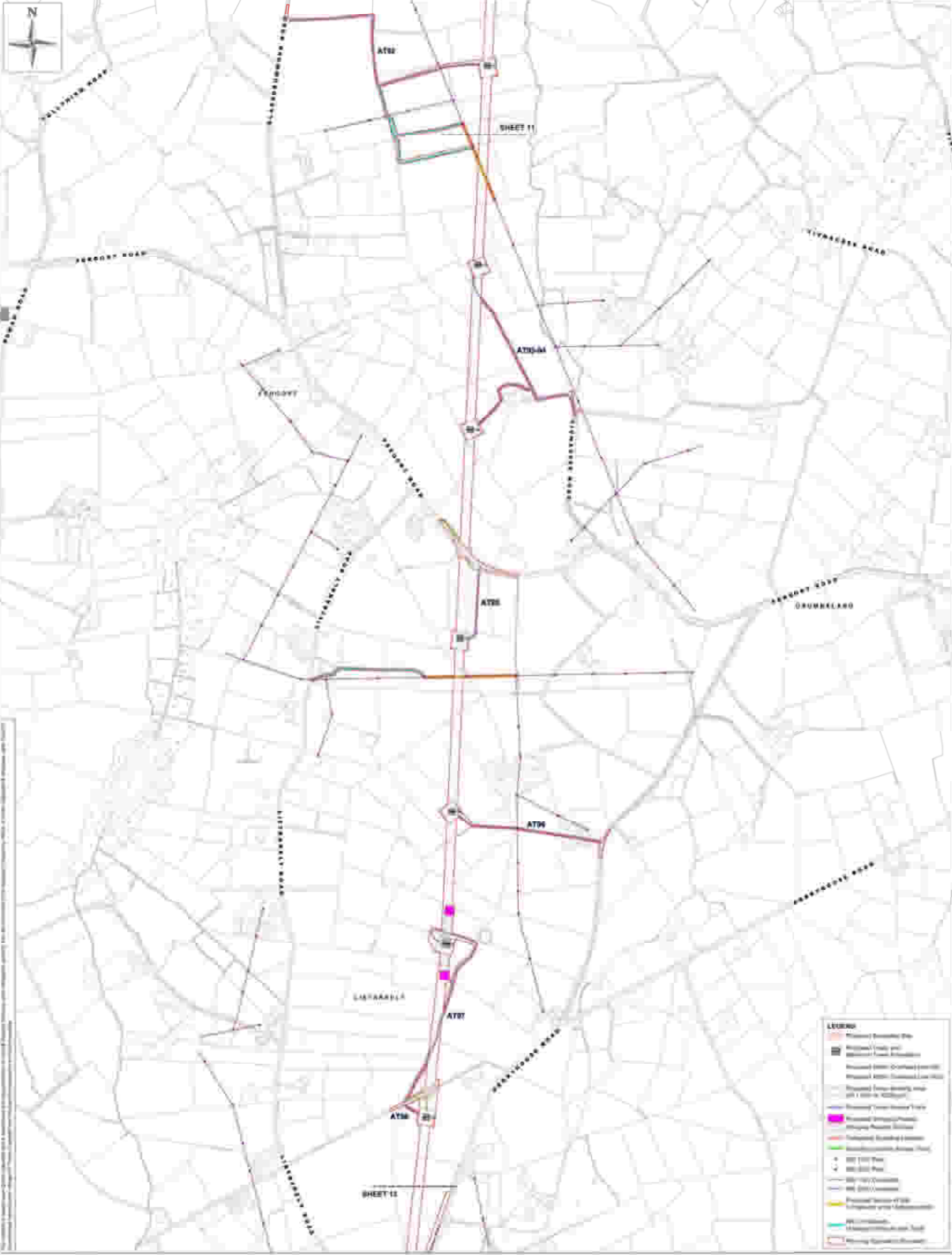






LEGEND

- Proposed 400kV Line
- Proposed 220kV Line
- Proposed 110kV Line
- Existing 400kV Line
- Existing 220kV Line
- Existing 110kV Line
- Existing 33kV Line
- Existing 10kV Line
- Existing 4kV Line
- Existing 2kV Line
- Existing 1kV Line
- Existing 0.4kV Line
- Existing 0.2kV Line
- Existing 0.1kV Line
- Existing 0.05kV Line
- Existing 0.02kV Line
- Existing 0.01kV Line
- Existing 0.005kV Line
- Existing 0.002kV Line
- Existing 0.001kV Line
- Existing 0.0005kV Line
- Existing 0.0002kV Line
- Existing 0.0001kV Line
- Existing 0.00005kV Line
- Existing 0.00002kV Line
- Existing 0.00001kV Line





This material is based upon Crown Copyright and is reproduced with the permission of Land & Property Services under delegated authority from the Controller of Her Majesty's Stationery Office. © Crown Copyright & database right (1:2013).
 All other material is the property of AECOM and may not be reproduced or used in any form without the prior written permission of AECOM.

Annex 2 - Determination of Peak Hour Calculations

TA ANNEX 2: PEAK HOUR CALCULATIONS

SITE NO.	SITE LOCATION	YEAR	HOUR BEGINNING																							
			00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	Trewmount Rd	2012	19	6	7	6	6	27	71	150	275	207	220	219	225	228	236	256	313	379	232	168	160	127	94	44
2	Moy Road		50	25	24	20	42	93	218	415	636	508	428	479	503	494	552	581	655	769	572	451	357	306	217	127
3	Culverog Rd		1	0	0	0	0	0	2	4	6	5	5	3	5	4	4	5	4	5	6	6	4	3	1	1
4	Benburb Rd		6	2	1	0	1	3	21	32	56	45	37	45	46	49	53	61	69	72	55	54	39	36	22	9
5	Clonfeacle Rd		7	4	3	3	2	8	25	68	118	89	76	102	111	122	132	130	149	178	139	129	92	87	51	21
6	Artasooly Rd		2	2	1	0	0	2	4	20	48	28	21	25	21	25	29	38	43	40	42	29	28	23	14	5
7	Battleford Rd		12	8	4	3	3	11	55	132	281	148	127	130	145	136	172	209	199	194	148	109	78	58	47	22
8	Killylea Rd		20	12	7	7	12	30	89	255	474	312	253	258	251	280	293	343	383	414	316	244	170	148	101	49
9	Brotally Rd		1	0	0	1	0	1	2	5	10	14	9	10	10	14	14	12	15	11	11	11	9	9	7	3
10	Dernalea Rd		1	0	0	1	1	2	5	19	14	11	9	10	10	9	14	14	16	17	18	14	11	9	6	2
11	Drumhillery Rd		2	2	2	1	1	4	5	19	32	34	20	20	19	23	39	31	32	29	21	35	20	15	10	6
12	Fergot Rd		4	1	0	1	0	2	5	20	32	49	32	33	34	38	55	54	44	49	51	43	35	34	18	8
13	Lisrakelt Rd		1	0	0	0	0	5	3	4	10	12	9	8	12	18	8	9	11	13	13	13	10	6	7	3
14	Monaghan Rd		33	26	18	21	37	57	143	285	459	352	328	353	349	361	391	412	454	529	461	352	269	238	126	55
15	Maaddan Rd		8	3	3	4	4	7	22	51	91	71	60	65	63	66	74	100	88	93	74	60	53	39	31	18
16	Carn Rd		1	0	1	1	0	0	8	66	122	43	31	36	59	47	37	50	93	40	5	8	3	3	4	4
17	Derrygally Way	0	0	0	0	0	0	0	2	9	9	11	9	13	15	14	13	7	17	4	3	2	1	2	2	
18	Major Lane	0	0	0	0	0	0	0	0	2	1	4	0	2	4	1	0	3	3	2	2	2	3	2	0	
19	Culkeeran Rd	0	0	0	0	0	1	0	12	7	9	8	4	9	22	8	11	11	12	6	17	5	2	4	1	
20	Rhone Rd	0	0	0	0	0	0	2	2	0	0	0	0	1	4	3	2	4	6	5	4	2	2	2	0	
21	Gorestown Rd	1	3	0	4	0	9	33	20	41	30	27	24	32	51	47	35	60	106	41	36	32	17	10	9	
22	Drumlee Rd	0	0	0	1	1	5	7	4	19	9	12	10	15	17	12	20	11	38	18	18	6	3	1	3	
23	Tullydowey Rd	1	0	0	0	0	0	1	1	0	1	0	2	1	5	3	1	4	5	5	6	7	7	1	0	
24	Tullysaran Rd	0	0	0	0	0	2	1	8	25	6	6	10	11	15	20	25	17	15	15	15	7	10	14	5	1
25	Tullyneagh Rd	0	1	0	0	0	1	6	8	20	12	4	14	9	22	25	22	35	22	32	14	14	10	9	2	
26	Battleford Rd	10	3	4	7	3	15	29	70	194	118	79	115	85	124	138	151	168	193	132	107	61	59	39	22	
27	Bracknagh Rd	0	0	0	0	0	0	0	0	1	5	2	1	7	5	1	5	7	4	4	4	2	0	1	0	0
28	Navan Fort Rd	0	1	0	0	0	1	0	4	4	4	3	4	3	3	5	4	6	6	6	1	1	2	2	0	2
29	Cormeen Rd	0	0	0	0	1	0	2	10	35	15	15	12	18	17	19	26	26	37	20	18	5	6	6	1	
30	No Name	0	0	0	0	1	2	0	3	7	3	4	0	3	4	3	8	2	12	8	5	4	1	1	0	0
31	Tullycally Rd	0	0	0	0	0	0	1	1	4	2	3	0	5	0	8	1	3	5	3	2	1	1	1	0	0
32	Ballyhoy Rd	0	0	0	0	0	0	0	3	1	0	2	3	2	2	0	1	1	2	3	2	1	2	0	0	0
33	No Name	2	0	0	0	0	0	0	3	6	4	8	4	2	17	3	9	8	7	5	10	0	2	0	0	0
34	Dernalea Rd	0	0	0	0	0	0	0	0	3	1	6	1	6	3	1	0	0	0	0	0	2	2	0	0	0
35	Hanslough Rd	2	2	1	2	0	1	9	24	34	16	26	25	30	26	26	38	49	57	41	28	28	9	10	6	
36	Cavanagarvan Rd	1	1	0	0	3	0	1	2	7	1	4	3	7	6	3	5	3	7	2	5	0	2	2	1	0
37	Sheetrim Rd	0	0	0	0	0	0	0	0	1	2	1	3	4	4	5	1	3	0	1	0	0	0	1	0	0
38	Glassdrummond Rd	1	0	0	0	0	1	2	2	5	3	4	8	5	2	13	7	10	7	6	8	1	3	2	0	0
39	No Name	0	0	0	0	0	0	0	2	2	1	1	6	2	2	1	2	3	4	3	2	3	0	0	0	0
40	Derrynoose Rd	2	2	5	1	1	8	3	29	45	44	35	41	44	27	52	58	50	53	59	37	38	21	15	8	
41	No Name	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	2	4	0	0
42	Crossbane Rd	2	0	0	0	0	0	0	2	4	7	4	2	4	1	1	7	4	8	2	2	1	2	2	1	0
TOTAL			189	105	82	83	120	297	775	1,761	3,139	2,235	1,930	2,103	2,178	2,313	2,513	2,757	3,061	3,464	2,581	2,062	1,564	1,313	875	435

Annex 3 - Overhead Lines and Towers Traffic Generation

TA ANNEX 3: OVERHEAD LINE AND TOWERS TRAFFIC GENERATION CALCULATIONS

TOWER / SL	ACCESS REF.	ROAD NAME	TOWER TYPE	STRING-ING LOCATION	CONCRETE PER TOWER (cu.m)	WASTE SPOIL (Tonnes)	STONES (Tonnes)	TRAFFIC - STANDARD / NON-STANDARD	TOTAL WORK DAYS	GENERATED TRAFFIC FLOWS (ALLVEHICLES)								
										TOTAL			AVERAGE DAILY			MAXIMUM DAILY		
										LGVS	HGVs	TOTAL	LGVS	HGVs	TOTAL	LGVS	HGVs	TOTAL
1	AT1	Trewmount Road	90	SL	265	317		standard	19	122	154	276	6	8	15	4	30	34
2	AT2	Derrygally Way	90	SL	265	317	267	non-standard	19	122	208	330	6	11	17	2	36	38
3	AT3-4-5-6	Trewmount Road	Intermediate	-	25	30		standard										
4	AT3-4-5-6	Trewmount Road	60	SL	245	293	465	non-standard	57	350	434	784	6	8	14	2	42	44
5	AT3-4-5-6	Trewmount Road	Intermediate	-	25	30		standard										
6	AT3-4-5-6	Trewmount Road	60	SL	245	293	177	non-standard										
7	AT7	Major Lane	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
8	AT8-9	Moy Road	60	SL	245	293	240	non-standard										
9	AT8-9	Moy Road	Intermediate	-	25	30		standard	32	210	214	424	7	7	13	2	34	36
10	AT10	Culkeeran Road	30	-	133	158		standard	19	122	92	214	6	5	11	10	5	15
11	AT11	Culkeeran Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
12	AT12	Culkeeran Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
13	AT13	Rhone Road	60	SL	790	246	405	non-standard	19	122	362	484	6	19	25	2	52	54
14	AT14	Rhone Road	60	-	245	293	255	non-standard	19	122	188	310	6	10	16	2	34	36
15	AT15	Gorestown Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
16	AT16-17	Culrevog Road	Intermediate	-	25	30		standard										
17	AT16-17	Culrevog Road	60	SL	245	293	273	non-standard	32	210	220	430	7	7	13	2	36	38
18	AT18	Culrevog Road	Intermediate	-	25	30	285	non-standard	15	104	106	210	7	7	14	2	38	40
19	AT19	Culrevog Road	60	SL	329	395	399	non-standard	26	122	258	380	5	10	15	2	52	54
20	AT20	Benburb Road	Intermediate	-	25	30	108	non-standard	15	104	70	174	7	5	12	2	18	20
21	AT21	Benburb Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
22	AT22-23	Benburb Road	Intermediate	-	25	30		standard										
23	AT22-23	Benburb Road	60	SL	329	395	315	non-standard	32	222	260	482	7	8	15	2	44	46
23SL	AT23SL	Drumlee Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
24	AT24-25	Drumlee Road	Intermediate	-	25	30		standard	21	64	54	118	3	3	6	10	5	15
25	AT24-25	Drumlee Road	Intermediate	-	25	30		standard										
26	AT26	Benburb Road	60	SL	245	293	273	non-standard	19	122	204	326	6	11	17	2	36	38
27	AT27-28	Drumlee Road	Intermediate	-	25	30		standard										
28	AT27-28	Drumlee Road	60	SL	245	293	345	non-standard	32	210	234	444	7	7	14	2	44	46
29	AT29	Clonfeacle Road	30	-	133	158		standard	19	122	92	214	6	5	11	10	5	15
30	AT30	Tullydowey Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
31	AT31-32A	Tullydowey Road	Intermediate	-	25	30		standard	21	64	54	118	3	3	6	10	5	15
32	AT32B	Tullydowey Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
33	AT33	Artasooly Road	60	-	245	293	429	non-standard	19	122	224	346	6	12	18	2	54	56
33SL	AT33SL	Artasooly Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
34	AT34	Artasooly Road	60	-	245	293	261	non-standard	19	122	190	312	6	10	16	2	36	38
35	AT35	Artasooly Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
36	AT36	Artasooly Road	Intermediate	-	42	51	243	non-standard	15	104	98	202	7	7	13	2	34	36
37	AT37-38-39	Artasooly Road	60	SL	245	293	285	non-standard										
38	AT37-38-39	Artasooly Road	Intermediate	-	25	30		standard	44	284	437	721	6	10	16	2	46	48
39	AT37-38-39	Artasooly Road	60	SL	245	293	405	non-standard										
37SL	AT37SL	Artasooly Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
40	AT40	Tullysaran Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
41	AT41A	Tullysaran Road	30	SL	133	158		standard	19	122	104	226	6	5	12	10	11	21
42	AT41B-42	Tullysaran Road	Intermediate	-	25	30	201	non-standard	15	104	88	192	7	6	13	2	28	30
43	AT43	Tullyneagh Road	Intermediate	-	25	30	255	non-standard	15	104	100	204	7	7	14	2	34	36
44	AT44	Battleford Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
45	AT45	Battleford Road	Intermediate	-	42	51	237	non-standard	15	104	104	208	7	7	14	2	32	34
46	AT46	Battleford Road	30	SL	133	158		standard	19	122	104	226	6	5	12	10	11	21
47	AT47	Bracknagh Road	Intermediate	-	42	51	237	non-standard	15	104	104	208	7	7	14	2	32	34
48	AT48A	Bracknagh Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
48	AT48B	Bracknagh Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
49	AT49	Bracknagh Road	30	SL	133	158	300	standard	19	122	166	288	6	9	15	2	40	42
49SL	AT49SL	Bracknagh Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
50	AT50	Bracknagh Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
51	AT51	Navan Fort Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
52	AT52	Navan Fort Road	90	SL	265	317	231	standard	19	122	202	324	6	11	17	2	32	34
52SL	AT52SL	Navan Fort Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
53	AT53	Killylea Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
54	AT54	Killylea Road	Intermediate	-	25	30	66	standard	15	104	62	166	7	4	11	2	14	16
55	AT55	Cormeen Road	30	SL	133	158		standard	19	122	104	226	6	5	12	10	11	21
56	AT56	Cormeen Road	Intermediate	-	25	30	27	non-standard	15	104	54	158	7	4	11	10	5	15
57	AT57-58	Unclassified Road	Intermediate	-	68	85	309	non-standard										
58	AT57-58	Unclassified Road	30	SL	538	646	237	non-standard	34	256	380	636	8	11	19	2	38	40
58SL	AT58SL	Unclassified Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
59	AT59-60	Unclassified Road	Intermediate	-	25	30		standard										
60	AT59-60	Unclassified Road	Intermediate	-	25	30	99	non-standard	28	234	112	346	8	4	12	2	18	20
61	AT61	Ballyhoy Road	Intermediate	-	25	30	93	non-standard	15	104	66	170	7	4	11	2	16	18
62SL	AT62SL	Unclassified Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
62	AT62	Monaghan Road spur	30	SL	233	280	243	non-standard	19	122	182	304	6	10	16	2	34	36
63	AT63	Monaghan Road spur	Intermediate	-	42	51	213	non-standard	15	104	84	188	7	6	13	2	22	24
64	AT64	Monaghan Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
65	AT65	Brootally Road	Intermediate	-	25	30	120	non-standard	15	104	74	178	7	5	12	2	20	22
66	AT66	Brootally Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
67	AT67	Brootally Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
68	AT68A or AT68B	Dernalea Road	30	SL	133	158	285	non-standard	19	122	162	284	6	9	15	2	38	40
69	AT69	Dernalea Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
70	AT70	Dernalea Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
71	AT71-71SL1	Unclassified Road	60	SL	245	293	219	non-standard	19	122	192	314	6	10	17	2	30	32
71SL	AT71SL2	Unclassified Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
72	AT72	Dernalea Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
73	AT73	Maddan Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
74	AT74	Unclassified Road	30	SL	133	158		standard	19	122	104	226	6	5	12	10	11	21
74SL	AT74SL1A	Maddan Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
74SL	AT74SL1B	Maddan Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
74SL	AT74SL2	Maddan Road	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20
75	AT75	Unclassified Road	Intermediate	-	25	30	24	non-standard	15	104	54	158	7	4	11	10	5	15
76	AT76	Hanslough Road	60	SL	245	293	285	non-standard	19	122	206	328	6	11	17	2	38	40
77	AT77	Cavanagarvan Road	Intermediate	-	25	30		standard	15	104	46	150	7	3	10	10	5	15
78																		

Annex 4 - Overhead Lines and Towers Traffic Impacts

TA ANNEX 4: OVERHEAD LINE AND TOWERS TRAFFIC IMPACT CALCULATIONS

TOWER / SL	ACCESS REF.	ROAD NAME	TOWER TYPE	STRING-ING LOCATION	TOTAL WORK DAYS	DAILY TRAFFIC IMPACTS				AM PEAK (08:00-09:00) TRAFFIC IMPACTS				PM PEAK (17:00-18:00) TRAFFIC IMPACTS						
						BACKGROUND DAILY TRAFFIC	MAXIMUM DAILY DEV			TRAFFIC IMPACT %	BACKGROUND TRAFFIC	MAXIMUM DEV TRAFFIC			TRAFFIC IMPACT %	BACKGROUND TRAFFIC	MAXIMUM DEV TRAFFIC			TRAFFIC IMPACT %
							LGVS	HGVs	TOTAL			LGVS	HGVs	TOTAL			LGVS	HGVs	TOTAL	
1	AT1	Trewmount Road	90	SL	19	3782	4	30	34	0.9%	283	0	3	3	0.9%	390	0	3	3	0.6%
2	AT2	Derrygally Way	90	SL	19	137	2	36	38	27.7%	2	0	3	3	162.9%	3	0	3	3	86.3%
3	AT3-4-5-6	Trewmount Road	Intermediate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	AT3-4-5-6	Trewmount Road	60	SL	57	3782	2	42	44	1.2%	283	0	4	4	1.2%	390	0	4	4	0.9%
5	AT3-4-5-6	Trewmount Road	Intermediate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	AT3-4-5-6	Trewmount Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	A77	Major Lane	Intermediate	-	15	34	10	5	15	44.4%	0	0	2	2	488.8%	1	0	5	5	814.6%
8	AT8-9	Moy Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	AT8-9	Moy Road	Intermediate	-	32	10076	2	34	36	0.4%	657	0	3	3	0.4%	792	0	3	3	0.4%
10	AT10	Culkeeran Road	30	-	19	152	10	5	15	9.8%	1	0	2	2	139.6%	2	0	5	5	203.6%
11	AT11	Culkeeran Road	Intermediate	-	15	152	10	5	15	9.8%	1	0	2	2	139.6%	2	0	5	5	203.6%
12	AT12	Culkeeran Road	Intermediate	-	15	152	10	5	15	9.8%	1	0	2	2	139.6%	2	0	5	5	203.6%
13	AT13	Rhone Road	60	SL	19	40	2	52	54	135.3%	0	0	4	4	**	1	0	4	4	353.0%
14	AT14	Rhone Road	60	-	19	40	2	34	36	90.2%	0	0	3	3	**	1	0	3	3	230.8%
15	AT15	Gorestown Road	Intermediate	-	15	683	10	5	15	2.2%	8	0	2	2	23.8%	2	0	5	5	203.6%
16	AT16-17	Culrevog Road	Intermediate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	AT16-17	Culrevog Road	60	SL	32	67	2	36	38	56.7%	6	0	3	3	50.6%	5	0	3	3	58.7%
18	AT18	Culrevog Road	Intermediate	-	15	67	2	38	40	59.7%	6	0	3	3	53.4%	5	0	3	3	61.9%
19	AT19	Culrevog Road	60	SL	26	67	2	52	54	80.6%	6	0	4	4	73.0%	5	0	4	4	84.7%
20	AT20	Benburb Road	Intermediate	-	15	837	2	18	20	2.4%	57	0	2	2	2.6%	75	0	2	2	2.0%
21	AT21	Benburb Road	Intermediate	-	15	837	10	5	15	1.8%	57	0	2	2	3.5%	75	0	5	5	6.7%
22	AT22-23	Benburb Road	Intermediate	-	32	837	2	44	46	5.5%	57	0	4	4	6.4%	75	0	4	4	4.9%
23	AT22-23	Benburb Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23SL	AT23SL	Drumlee Road	n/a	n/a	5	235	n/a	n/a	20	8.5%	4	n/a	n/a	5	128.6%	8	n/a	n/a	5	64.3%
24	AT24-25	Drumlee Road	Intermediate	-	21	235	10	5	15	6.4%	4	0	5	5	128.6%	8	0	5	5	64.3%
25	AT24-25	Drumlee Road	Intermediate	-	21	235	10	5	15	6.4%	4	0	5	5	128.6%	8	0	5	5	64.3%
26	AT26	Benburb Road	60	SL	19	818	2	36	38	4.6%	57	0	3	3	5.3%	74	0	3	3	4.1%
27	AT27-28	Drumlee Road	Intermediate	-	32	235	2	44	46	19.6%	4	0	4	4	94.3%	8	0	4	4	47.2%
28	AT27-28	Drumlee Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	AT29	Clonfacle Road	30	-	19	1901	10	5	15	0.8%	122	0	2	2	1.6%	184	0	5	5	2.7%
30	AT30	Tullydowey Road	Intermediate	-	15	52	10	5	15	28.8%	0	0	2	2	**	2	0	5	5	203.6%
31	AT31-32A	Tullydowey Road	Intermediate	-	21	52	10	5	15	28.8%	0	0	5	5	**	1	0	5	5	488.8%
32	AT32B	Tullydowey Road	Intermediate	-	15	52	10	5	15	28.8%	0	0	5	5	**	1	0	5	5	488.8%
33	AT33	Artasooly Road	60	-	19	505	2	54	56	11.1%	50	0	5	5	9.0%	42	0	5	5	10.7%
33SL	AT33SL	Artasooly Road	n/a	n/a	5	505	n/a	n/a	20	4.0%	50	n/a	n/a	5	10.0%	42	n/a	n/a	5	11.9%
34	AT34	Artasooly Road	60	-	19	505	2	36	38	7.5%	50	0	3	3	6.0%	42	0	3	3	7.1%
35	AT35	Artasooly Road	Intermediate	-	15	505	10	5	15	3.0%	50	0	2	2	4.0%	42	0	5	5	11.9%
36	AT36	Artasooly Road	Intermediate	-	15	505	2	34	36	7.1%	50	0	3	3	5.7%	42	0	3	3	6.7%
37	AT37-38-39	Artasooly Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	AT37-38-39	Artasooly Road	Intermediate	-	44	505	2	46	48	9.5%	50	0	4	4	7.7%	42	0	4	4	9.1%
39	AT37-38-39	Artasooly Road	60	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37SL	AT37SL	Artasooly Road	n/a	n/a	5	505	n/a	n/a	20	4.0%	50	n/a	n/a	5	10.0%	42	n/a	n/a	5	11.9%
40	AT40	Tullysaran Road	Intermediate	-	15	218	10	5	15	6.9%	5	0	2	2	39.1%	2	0	5	5	203.6%
41	AT41A	Tullysaran Road	30	SL	19	218	10	11	21	9.6%	5	0	1	1	17.9%	3	0	1	1	29.9%
42	AT41B-42	Tullysaran Road	Intermediate	-	15	218	2	28	30	13.8%	5	0	2	2	45.6%	3	0	2	2	76.0%
43	AT43	Tullyneagh Road	Intermediate	-	15	288	2	34	36	12.5%	4	0	3	3	69.2%	5	0	3	3	62.9%
44	AT44	Battleford Road	Intermediate	-	15	2505	10	5	15	0.6%	289	0	2	2	0.7%	200	0	5	5	2.5%
45	AT45	Battleford Road	Intermediate	-	15	2505	2	32	34	1.4%	289	0	3	3	0.9%	200	0	3	3	1.3%
46	AT46	Battleford Road	30	SL	19	2505	10	11	21	0.8%	289	0	1	1	0.3%	200	0	1	1	0.5%
47	AT47	Bracknagh Road	Intermediate	-	15	46	2	32	34	73.9%	0	0	3	3	1303.4%	1	0	3	3	325.8%
48	AT48A	Bracknagh Road	Intermediate	-	15	46	10	5	15	32.6%	0	0	5	5	2443.8%	1	0	5	5	610.9%
48B	AT48B	Bracknagh Road	Intermediate	-	15	46	10	5	15	32.6%	0	0	5	5	2443.8%	1	0	5	5	610.9%
49	AT49	Bracknagh Road	30	SL	19	46	2	40	42	91.2%	0	0	3	3	1629.2%	1	0	3	3	407.3%
49SL	AT49SL	Bracknagh Road	n/a	n/a	5	46	n/a	n/a	20	43.4%	0	0	0	5	2443.8%	1	0	0	5	610.9%
50	AT50	Bracknagh Road	Intermediate	-	15	46	10	5	15	32.6%	0	0	2	2	977.5%	2	0	5	5	203.6%
51	AT51	Navan Fort Road	Intermediate	-	15	57	10	5	15	26.2%	1	0	2	2	244.4%	2	0	5	5	203.6%
52	AT52	Navan Fort Road	90	SL	19	57	2	32	34	59.3%	1	0	3	3	325.8%	1	0	3	3	217.2%
52SL	AT52SL	Navan Fort Road	n/a	n/a	5	57	n/a	n/a	20	34.9%	1	n/a	n/a	5	610.9%	1	n/a	n/a	5	407.3%
53	AT53	Killylea Road	Intermediate	-	15	4863	10	5	15	0.3%	488	0	2	2	0.4%	426	0	5	5	1.2%
54	AT54	Killylea Road	Intermediate	-	15	4863	2	14	16	0.3%	488	0	1	1	0.2%	426	0	1	1	0.3%
55	AT55	Cormeen Road	30	SL	19	296	10	11	21	7.1%	7	0	1	1	12.8%	8	0	1	1	12.1%
56	AT56	Cormeen Road	Intermediate	-	15	296	10	5	15	5.1%	7	0	2	2	27.9%	2	0	5	5	203.6%
57	AT57-58	Unclassified Road	Intermediate	-	34	73	2	38	40	55.1%	1	0	3	3	221.1%	2	0	3	3	129.0%
58	AT57-58	Unclassified Road	30	SL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58SL	AT58SL	Unclassified Road	n/a	n/a	5	73	n/a	n/a	20	27.5%	1	n/a	n/a	5	349.1%	2	n/a	n/a	5	203.6%
59	AT59-60	Unclassified Road	Intermediate	-	28	73	2	18	20	70.4%	1	0	2	2	104.7%	2	0	2	2	61.1%
60	AT59-60	Unclassified Road	Intermediate	-	28	73	2	18	20	70.4%	1	0	2	2	104.7%	2	0	2	2	61.1%
61	AT61	Ballyhoj Road	Intermediate	-	15	26	2	16	18	27.5%	0	0	1	1	651.7%	0	0	1	1	325.8%
62	AT62	Monaghan Road spur	30	SL	19	92	2	34	36	39.1%	1	0	3	3	230.8%	1	0	3	3	197.8

Annex 5 - Technical Note on Sightline Requirements for Turleenan Substation Accesses

TA Annex 5: Turleenan Substation Sightline Requirements

Project:	Tyrone-Cavan Interconnector	Job No:	60096814
Subject:	Turleenan Substation Sightline Assessment		
Prepared by:	Claire Mc Dowell	Date:	06th March 2013
Checked by:	Emma Greenlees	Date:	06th March 2013
Approved by:	Tim Robinson	Date:	06th March 2013

Background

AECOM Ltd has been commissioned by Northern Ireland Electricity (NIE) to carry out an assessment of the site access arrangements for the NIE Turleenan Substation situated on B106 Trewmount Road. This technical note details the sightline requirements on the basis of guidelines within Development control Advice Note (DCAN) 15.

Access Design Options

There are two potential accesses under review in relation to the proposed substation. Initially when construction work begins access to the site will be via a temporary access to the north of 152 Trewmount Road. This will provide for the existing buildings on the site to stay in use during construction, if required. The access will make use of the existing laneway adjacent to the site. This temporary track consists of stones and will be in place until construction works are complete.

Once construction work is complete a permanent access will replace the temporary access to the site and will be located south of the temporary access, requiring the demolition of the existing dwelling on the site.

The accesses have been designed to NIE specification of 10m width for the first 20m then 6m thereafter with 15m radii for the typical large vehicle using the road to construct and serve the sub-station.

Development Traffic Generation

Temporary Access

The Temporary access will be used for the construction phase of the development. At the peak of the construction phase there will be no more than 200 vehicles per day (two way) using the accesses.

Permanent Access

Once completed traffic will access the site via the permanent access. It is anticipated for the majority of the time the operational traffic will total a maximum of one vehicle per week i.e. 2 vehicle movements (two way). Notwithstanding this at the peak traffic generation time when maintenance traffic is also generated i.e. over a period of one week per calendar year 3 or 4 vehicles per day entering or exiting the site (6 or 8 two way). Therefore to represent a robust assessment the peak traffic generation per day is anticipated as 10 vehicles per day (two way) using the access.

Speed Survey

Methodology

Speed surveys were undertaken, taking cognisance of guidelines within Department Of Transport Roads And Local Transport Directorate Departmental Advice Note TA 22/81 - Vehicle Speed Measurement on All Purpose Roads. The survey methodology included:

TA Annex 5: Turleenan Substation Sightline Requirements

- The survey was undertaken in a typical week using an automated traffic counter.
- The survey was carried out from 14th March to 20th March 2009, during which the weather was cloudy and the road surface dry.

The survey location was on Trewmount Road at the midpoint of the site frontage.

Results

The results of the speed survey are summarised in Table 1 below and the raw survey data is shown in Appendix 1.

Table 1:- ATC Speed Survey Results

SURVEY DETAILS	SITE ACCESS	
	NORTHBOUND	SOUTHBOUND
85 th Percentile Dry Weather Spot Speed	58.4mph	58.5mph

Section 3.4 of TA 22/81 states “For improvement of alignments and major/minor junctions or accesses, and for new major/minor junctions or accesses on existing roads, the normal design methods are based on the 85th percentile wet weather journey speed of vehicles. To get from the dry weather spot speed of vehicles measured to the wet weather journey speed used in design, one of the following correction factors should be used:

- For AP dual carriageways - deduct 8kph (5mph)
- For AP single carriageways - deduct 4kph (2.5mph)

From Table 1, the maximum 85th percentile dry weather spot speed is 58.5mph for the site access onto Trewmount Road. Applying the reduction of 2.5mph for single carriageways provides a design wet weather journey speed of 56mph.

Visibility Splays

The temporary site access will have an estimated maximum two way flow in the order of 200 vehicles throughout the construction period. The permanent site access will have an estimated maximum two way flow in the order of 10 vehicles per day. The design speed on the priority road at the proposed access is 56mph.

DCAN 15 states the minimum X distance requirement for a development with traffic flow between 60 and 1000 vpd is normally 4.5m. This may be reduced to 2.4m, but only if traffic speeds on the priority road are below 60 kph (37 mph) and danger is unlikely to be caused.

The Y distance for a design speed of 56mph and access flow of between 60 and 1000 vpd is 168.3m. Hence the sightline requirements for the temporary access are 4.5m x 168.3m.

DCAN 15 states for an access with flow of up to 60 vpd the minimum X distance is 2.4m. The Y distance in this occasion is 133.3m. Hence the sightline requirements for the permanent access are 2.4 x 133.3m.

TA Annex 5: Turleenan Substation Sightline Requirements

Conclusion

For both the access locations, the temporary and the permanent, sightlines of 4.5m x 168.3m are achieved without encroaching on third party land however removal of a wall is required at the front of 152 Trewmount Road. Roads Service has confirmed via telephone conversation that they have adopted the road across the full width of the carriageway including the verges from the centre of the hedge.

On the basis of a speed survey, the sightline requirements for the proposed development accesses have been calculated. The requirements for the temporary accesses are 4.5m x 168.3m on the basis of a maximum daily traffic flow of 200vpd. The requirements for the permanent access are 2.4m x 133.3m on the basis of a maximum daily flow of 10vpd. Notwithstanding this it is proposed to provide the larger sightlines (4.5m x 168.3m) for both access.

TA Annex 5: Turleenan Substation Sightline Requirements

ATC SPEED SURVEY DATA

Dungannon ATC, Trew Mount Road, Dungannon
Produced by Streetwise Services Ltd.

Channel 1 - Northbound

Table with 13 columns for Vehicle Classes (0-12) and 24 rows of data. Includes sub-totals for 19/03/2009 and 0:24.

Channel 2 - Southbound

Table with 13 columns for Vehicle Classes (0-12) and 24 rows of data. Includes sub-totals for 19/03/2009 and 0:24.

Dungannon ATC, Trew Mount Road, Dungannon
Produced by Streetwise Services Ltd.

Channel 1 - Northbound

Table with 13 columns for Vehicle Speeds (MPH) (0-10 to 81-90) and 24 rows of data. Includes sub-totals for 19/03/2009 and 0:24.

Channel 2 - Southbound

Table with 13 columns for Vehicle Speeds (MPH) (0-10 to 81-90) and 24 rows of data. Includes sub-totals for 19/03/2009 and 0:24.

Dungannon ATC, Trew Mount Road, Dungannon
Produced by Streetwise Services Ltd.

Channel 1 - Northbound

Table with columns for Vehicle Classes (0-10) and Vehicle Speeds (MPH) ranges. Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Dungannon ATC, Trew Mount Road, Dungannon
Produced by Streetwise Services Ltd.

Channel 1 - Northbound

Table with columns for Vehicle Speeds (MPH) ranges and Vehicle Classes (0-10). Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Channel 2 - Southbound

Table with columns for Vehicle Classes (0-10) and Vehicle Speeds (MPH) ranges. Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Channel 2 - Southbound

Table with columns for Vehicle Speeds (MPH) ranges and Vehicle Classes (0-10). Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Channel 1 - Northbound

Table with columns for Vehicle Classes (0-10) and Vehicle Speeds (MPH) ranges. Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Channel 2 - Southbound

Table with columns for Vehicle Speeds (MPH) ranges and Vehicle Classes (0-10). Includes rows for HH Ending, 20/03/2009, and totals for 0-24, 6-22, and 0-24.

Annex 6 – CRF Calculations

Annex 7 - 12 Hour Traffic Profiles for Roads with more than 10% Traffic Impacts

TA ANNEX 7: 12 HOUR FLOW PROFILES

HOUR BEGINNING	CULVEROG ROAD			DERRYGALLY WAY			MAJOR LANE			CULKEERAN ROAD			RHONE ROAD			DRUMLEE ROAD		
	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL
07:00	4	5	9	2	4	6	2	8	10	12	8	20	2	5	7	4	5	9
08:00	6	4	10	9	3	12	2	2	4	7	2	9	0	4	4	19	4	23
09:00	5	4	9	9	3	12	1	0	1	9	0	9	0	4	4	9	4	13
10:00	6	4	10	11	4	15	4	0	4	8	0	8	0	4	4	12	4	16
11:00	3	4	7	9	3	12	0	0	0	4	0	4	0	4	4	10	4	14
12:00	6	5	11	13	3	16	2	0	2	9	0	9	1	4	5	15	4	19
13:00	5	5	10	15	3	18	4	0	4	23	0	23	4	4	8	17	3	20
14:00	4	5	9	14	3	17	1	0	1	8	0	8	3	4	7	12	3	15
15:00	6	5	11	13	3	16	0	0	0	11	0	11	2	4	6	20	3	23
16:00	4	4	8	7	3	10	3	0	3	11	0	11	4	5	9	11	3	14
17:00	5	4	9	17	3	20	3	0	3	12	0	12	6	5	11	39	4	43
18:00	6	5	11	4	4	8	2	5	7	6	5	11	5	5	10	18	5	23

HOUR BEGINNING	TULLYDOWEY ROAD			ARTASOOLY ROAD			TULLYSARAN ROAD			TULLYNEAGH ROAD			BRACKNAGH ROAD			NAVAN FORT ROAD		
	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL
07:00	1	8	9	20	6	26	8	4	12	8	4	12	0	5	5	4	4	8
08:00	0	2	2	49	5	54	26	2	28	20	3	23	1	3	4	4	3	7
09:00	1	0	1	28	5	33	6	2	8	12	3	15	5	4	9	4	3	7
10:00	0	0	0	22	5	27	6	2	8	4	3	7	2	4	6	3	3	6
11:00	2	0	2	25	4	29	10	2	12	14	3	17	1	3	4	4	3	7
12:00	1	0	1	22	4	26	11	2	13	9	3	12	7	3	10	3	3	6
13:00	5	0	5	25	4	29	15	2	17	23	3	26	5	3	8	3	2	5
14:00	3	0	3	30	4	34	20	2	22	26	3	29	1	3	4	5	2	7
15:00	1	0	1	39	4	43	26	3	29	23	2	25	5	3	8	4	2	6
16:00	4	0	4	44	4	48	17	3	20	36	2	38	7	3	10	6	2	8
17:00	5	0	5	41	5	46	15	2	17	23	3	26	4	3	7	6	3	9
18:00	5	5	10	43	6	49	15	4	19	33	4	37	4	5	9	1	4	5

HOUR BEGINNING	CORMEEN ROAD			UNCLASSIFIED ROAD (AT57-59)			BALLYHOY ROAD			BROOTALLY ROAD			DERNALEA ROAD			HANSLOUGH ROAD		
	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL
07:00	10	4	14	3	4	7	3	3	6	5	3	8	3	4	7	25	4	29
08:00	36	1	37	7	3	10	1	1	2	11	2	13	1	3	4	35	3	38
09:00	15	1	16	3	3	6	0	1	1	14	2	16	6	3	9	16	3	19
10:00	15	1	16	4	3	7	2	2	4	9	2	11	1	3	4	27	3	30
11:00	12	1	13	0	3	3	3	2	5	10	2	12	6	3	9	26	3	29
12:00	18	1	19	3	3	6	2	1	3	10	2	12	1	3	4	31	3	34
13:00	17	1	18	4	3	7	2	1	3	14	1	15	3	3	6	27	3	30
14:00	19	2	21	3	3	6	0	1	1	15	1	16	1	3	4	27	3	30
15:00	27	2	29	8	4	12	1	1	2	12	1	13	0	4	4	39	4	43
16:00	27	2	29	2	4	6	1	1	2	13	1	14	0	4	4	50	4	54
17:00	38	1	39	12	3	15	2	1	3	15	2	17	0	3	3	58	3	61
18:00	20	4	24	8	4	12	3	3	6	11	3	14	0	4	4	42	4	46

HOUR BEGINNING	CAVANAGARVAN ROAD			SHEETRIM ROAD			TIVNACREE ROAD			GLASSDRUMMOND ROAD			LISTRAKELT ROAD			DERRYNOOSE ROAD		
	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL	BACK-GROUND	DEV	TOTAL
07:00	2	4	6	1	4	5	2	5	7	2	3	5	5	4	9	30	4	34
08:00	7	4	11	2	3	5	2	4	6	5	2	7	11	3	14	46	3	49
09:00	1	4	5	1	3	4	1	4	5	3	2	5	12	3	15	45	3	48
10:00	4	4	8	3	3	6	1	4	5	4	3	7	9	3	12	36	3	39
11:00	3	4	7	4	3	7	6	3	9	8	3	11	8	3	11	42	3	45
12:00	7	4	11	4	3	7	2	3	5	5	2	7	12	3	15	45	3	48
13:00	6	4	10	5	3	8	2	3	5	2	2	4	18	3	21	28	3	31
14:00	3	4	7	1	3	4	1	3	4	13	2	15	8	3	11	53	3	56
15:00	5	4	9	1	2	3	2	3	5	7	2	9	9	2	11	59	2	61
16:00	3	4	7	3	2	5	3	3	6	10	2	12	11	2	13	51	2	53
17:00	7	4	11	0	3	3	4	4	8	7	2	9	14	3	17	54	3	57
18:00	2	4	6	1	4	5	3	5	8	6	3	9	13	4	17	60	4	64

HOUR BEGINNING	UNCLASSIFIED ROAD (AT102)		
	BACK-GROUND	DEV	TOTAL
07:00	0	3	3
08:00	0	3	3
09:00	0	2	2
10:00	0	3	3
11:00	0	3	3
12:00	0	3	3
13:00	1	3	4
14:00	0	3	3
15:00	0	2	2
16:00	1	2	3
17:00	2	2	4
18:00	1	3	4

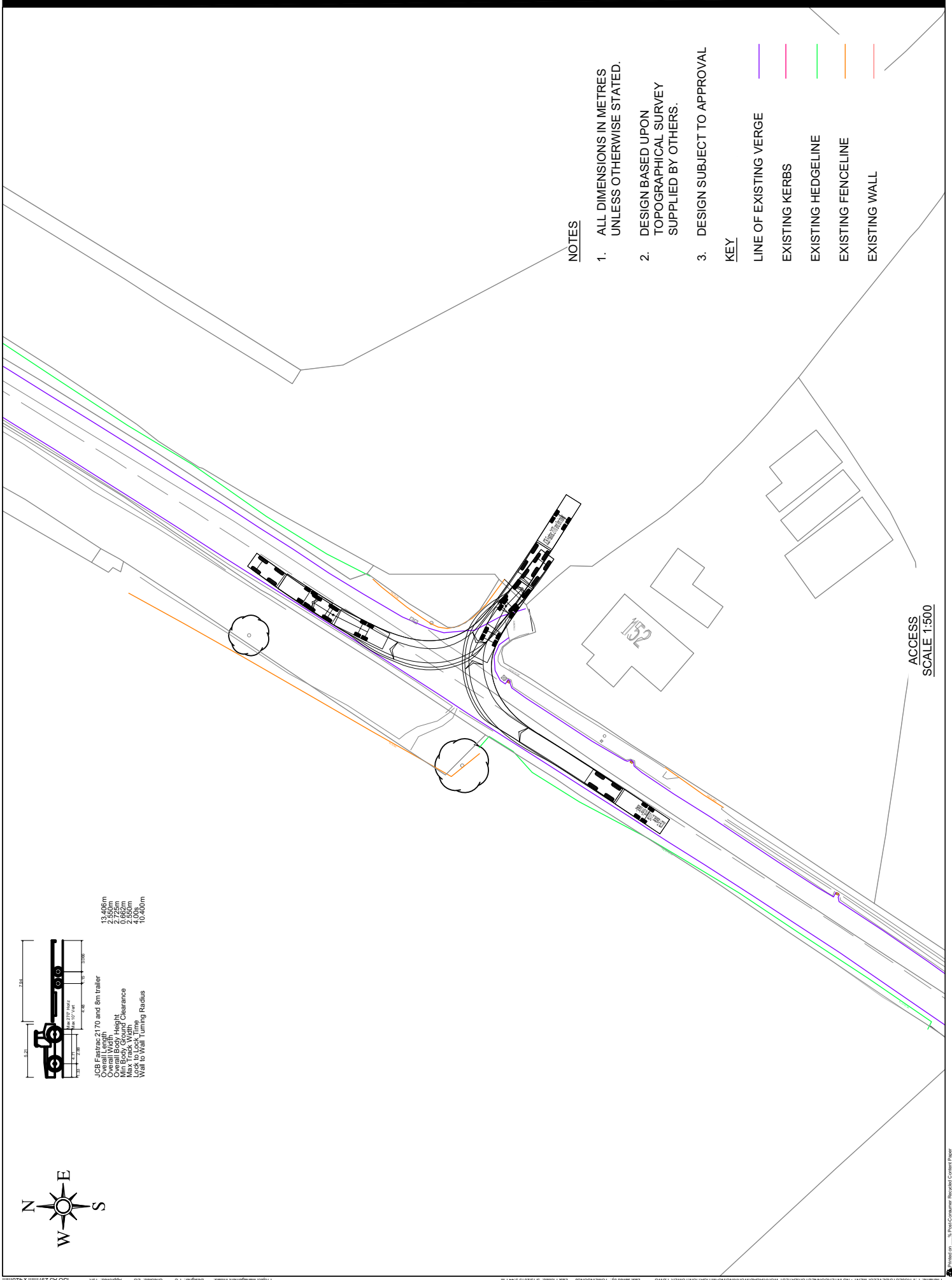
Annex 8 – Haul Routes

TA ANNEX 8: HAUL ROUTES

SECTION	TOWER	ACCESS TRACK	ROAD	CARN INDUSTRIAL ESTATE		QUARRY SOURCE FOR STONES		SPOIL DISPOSAL TO LANDFILL		CONCRETE SOURCE	
				APPROACH	VIA ROAD(S)	APPROACH	VIA ROAD(S)	DIRECTION	VIA ROAD(S)	APPROACH	VIA ROAD(S)
1	1	AT1	B106 - Trewmount Road	NORTH	B106 - Trewmount Road onto M1	SOUTH	B106 Trewmount Road onto A29 Moy Road	NORTH	B106 Trewmount Road	SOUTH	B106 Trewmount Road onto A29 Armagh Road
	2	AT2	Derrigally Way								
	3										
	4	AT3-4-5-6									
	5										
	6										
2	7	AT7	Major Lane	NORTH	A29 Moy Road onto M1	SOUTH	A29 Moy Road	SOUTH-EAST	A29 onto A51 then A27	SOUTH	A29 Moy Road
	8	AT8-9	A29 - Moy Road								
	9										
	10	AT10	Culkeeran Road								
	11	AT11	Culkeeran Road								
	12	AT12	Culkeeran Road								
	13	AT13	Rhone Road								
	14	AT14	Rhone Road								
	15	AT15	Gorestown Road								
	16	AT16-17									
4	17		Culverog Road	NORTH	A29 Moy Road onto M1	SOUTH	A29 Moy Road	SOUTH-EAST	A29 onto A51 then A27	SOUTH	A29 Moy Road
	18	AT18									
	19	AT19									
	20	AT20	Benburb Road								
5	21	AT21	Benburb Road	NORTH	A29 Moy Road onto M1	EAST	A29 Moy Road	SOUTH-EAST	A29 onto A51 then A27	WEST	B130 onto B45
	22	AT22-23	Benburb Road								
	23										
	24	AT24-25	Drumlee Road								
	25	AT26	Benburb Road								
	26	AT27	Benburb Road								
	27	AT27-28	Drumlee Road								
	28										
29	AT29	Benburb Road									
6	30	AT30		NORTH	Clonfeacle Road onto A29 Moy Road then M1	EAST	Clonfeacle Road onto A29 Moy Road	SOUTH-EAST	Clonfeacle Road towards A29, onto A51 then A27	EAST	Clonfeacle Road onto A29 Moy Road
	31	AT31	Tullydowey Road								
	32	AT32									
7	33	AT33-33SL		NORTH	Clonfeacle Road onto A29 Moy Road then M1	EAST	Clonfeacle Road onto A29 Moy Road	SOUTH-EAST	Clonfeacle Road towards A29, onto A51 then A27	EAST	Clonfeacle Road onto A29 Moy Road
	34	AT34									
	35	AT35	Artasooly Road								
	36	AT36									
	37										
	38	AT37-37SL-38-39									
	39										
8	40	AT40	Tullysaran Road	NORTH-EAST	Battleford Road onto A3 Portadown Road	SOUTH	Battleford Road onto A28 Killylea Road	EAST	Battleford Road onto A51 then A27	SOUTH	Battleford Road onto A28 Killylea Road
	41	AT41	Tullyneagh Road								
	42	AT42	Tullyneagh Road								
	43	AT43	Tullyneagh Road								
	44	AT44	Battleford Road								
9	45	AT45	Battleford Road	NORTH-EAST	Battleford Road onto A3 Portadown Road	SOUTH	Battleford Road onto A28 Killylea Road	EAST	Battleford Road onto A51 then A27	SOUTH	Battleford Road onto A28 Killylea Road
	46	AT46	Battleford Road								
	47	AT47	Bracknagh Road								
	48	AT48	Bracknagh Road								
	49	AT49-49SL	Bracknagh Road								
10	50	AT50	Bracknagh Road	NORTH-EAST	A28 Killylea Road onto A3 Portadown Road	EAST	A28 Killylea Road	NORTH WEST	A28 Killylea Road onto Derrycourtney Road then Tullyvar Road	EAST	A28 Killylea Road
	51	AT51	Navan Fort Road								
	52	AT52-52SL	Navan Fort Road								
	53	AT53	Killylea Road								
	54	AT54	Killylea Road								
	55	AT55	Cormeen Road								
	56	AT56	Cormeen Road								
	57	AT57-58-58SL	Unclassified								
	58										
	59	AT59-60	Unclassified								
60											
62	AT62SL	Tullyvalley Road									

11	61	AT161	Ballyhoey Road	NORTH-EAST	A3 Monaghan Road onto A3 Portadown Road	NORTH	A3 Monaghan Road onto A28 Killybegs Road	EAST	A3 Monaghan Road onto A51 then A27	SOUTH	A3 Monaghan Road
	62	AT162	Monaghan Road								
	63	AT163	Not Known								
	64	AT164	Monaghan Road								
	65	AT165	Broctally Road								
	66	AT166	Broctally Road								
	67	AT167	Broctally Road								
	68	AT168	Dernalea Road								
	69	AT169	Dernalea Road								
	70	AT170	Dernalea Road								
	71	AT171-71.5L	Unclassified								
72	AT172	Dernalea Road									
73	AT173	Maddan Road									
74	AT174-74.5L	Unclassified									
75	AT175	Unclassified									
76	AT176	Hanslough Road									
77	AT177	Cavanagarvan Road									
12	78	AT178	Cavanagarvan Road	NORTH-EAST	B132 Maddan Road onto A3 Monaghan Road then A3 Portadown Road	SOUTH	B132 Maddan Road onto B3 Derrynoose Road	NORTH-EAST	B132 Maddan Road onto A3 Monaghan Road then A51 and finally A27	NORTH-WEST	B132 Maddan Road onto A3 Monaghan Road
	79	AT179	Cavanagarvan Road								
	80	AT180	Sheirrim Road								
	81	AT181	Sheirrim Road								
	82	AT182	Sheirrim Road								
13	83	AT183	Sheirrim Road	NORTH	Drumhillery Road onto A3 Monaghan Road	SOUTH	Drumhillery Road onto B3 Derrynoose Road	NORTH-EAST	Drumhillery Road onto B3 until A27	NORTH-EAST	Drumhillery Road onto B3
	84	AT184	Sheirrim Road								
	85	AT185-85.5L	Sheirrim Road								
	86	AT186	Drumhillery Road								
	87	AT187	Drumhillery Road								
	88	AT188	Tynacree Road								
	89	AT189	Tynacree Road								
	90	AT190	Tynacree Road								
14	91	AT191	Glassdrummond Road	NORTH	B3 Fergort Road onto A29 Keady Road onto A3 Portadown Road	EAST	B3 Derrynoose Road	NORTH-EAST	B3 Derrynoose Road until A27	EAST	B3 Derrynoose Road
	92	AT192	Glassdrummond Road								
	93	AT193-94	Unclassified								
	94	AT193-94	Unclassified								
	95	AT195	Fergort Road								
	96	AT196	No name								
	97	AT197	Listrakat Road								
15	98	AT198	Listrakat Road	NORTH	Derrynoose Road onto A29 Keady Road onto A3 Portadown Road	EAST	B3 Derrynoose Road	NORTH-EAST	B3 Derrynoose Road until A27	EAST	B3 Derrynoose Road
	99	AT199	Derrynoose Road								
	100	AT100	Derrynoose Road								
	101	AT101	Derrynoose Road								
	102	AT102	Unclassified								
OS	AT05	Crossbane Road									

Annex 9 – Overhead Line and Towers Access Assessment & AutoTracks of Accesses Requiring No Mitigation



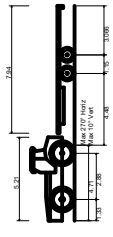
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

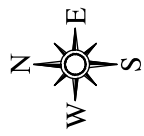
KEY

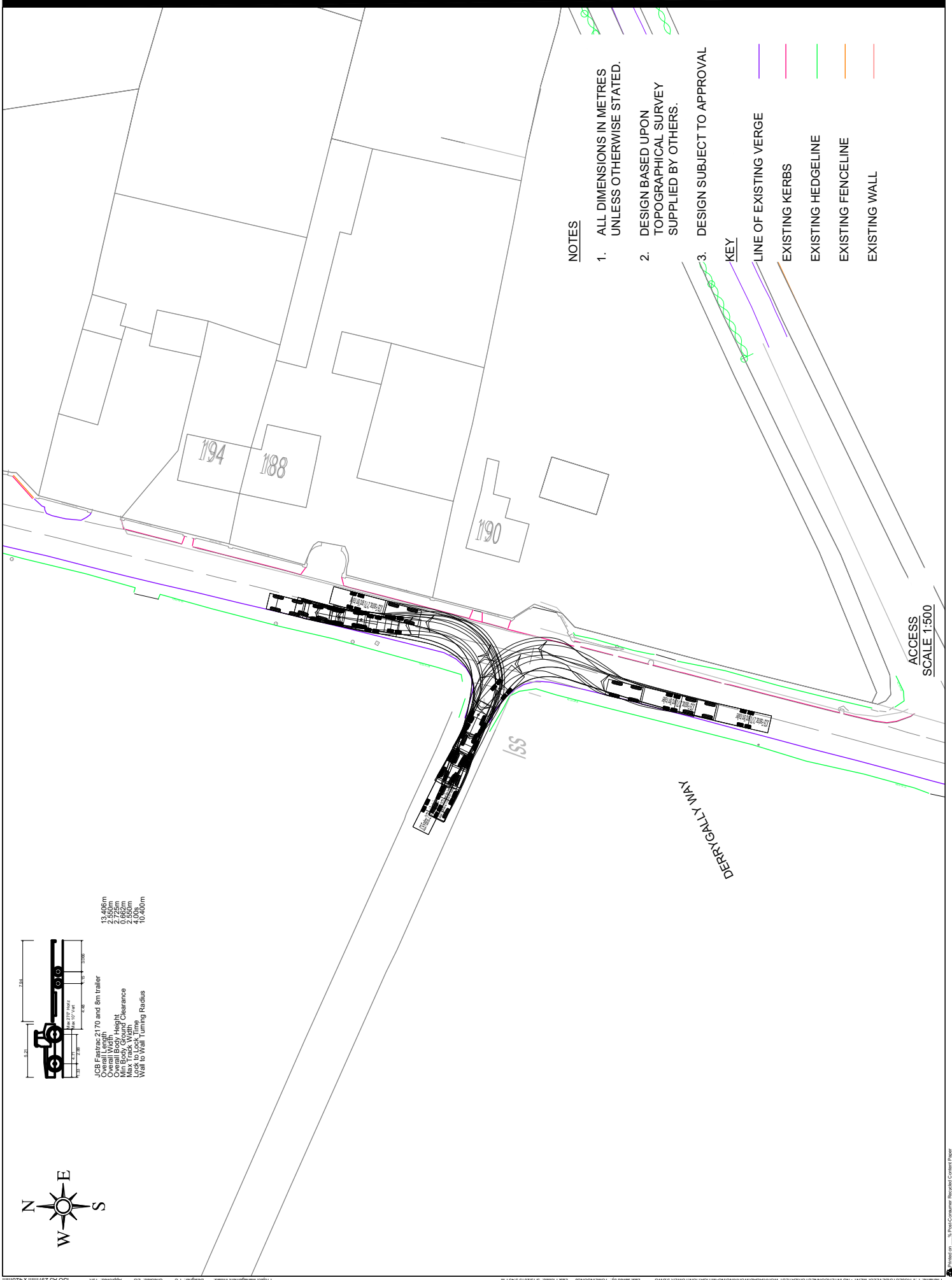
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Width 2.54m
 Overall Height 4.97m
 Overall Body Height 2.725m
 Max. Wheelbase 4.30m
 Max. Track Width 2.550m
 Lock to Lock Time 4.00s
 Walk to Wall Turning Radius 10.400m





NOTES

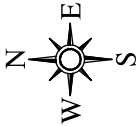
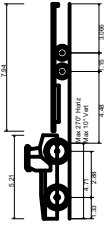
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

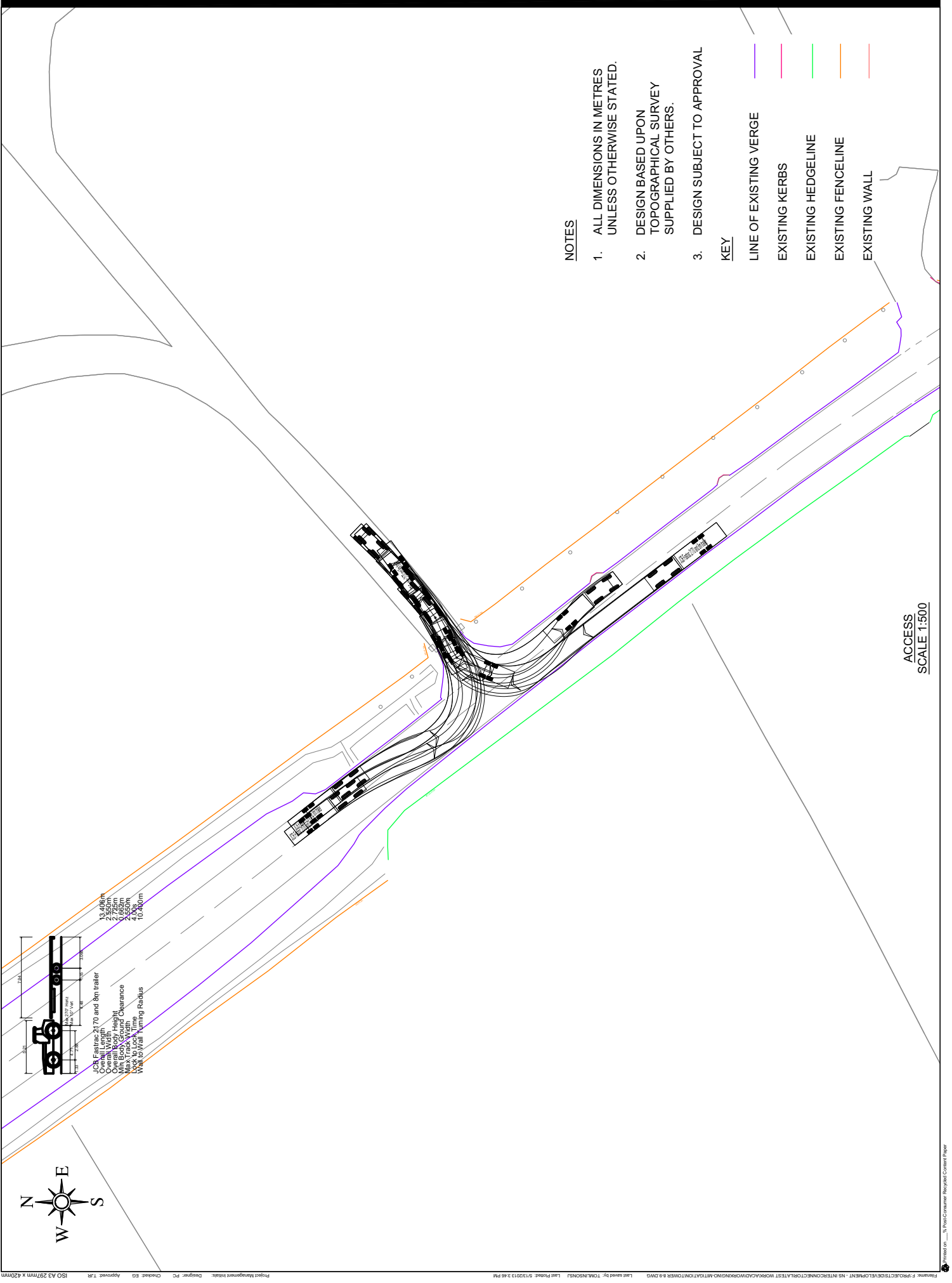
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL

ACCESS SCALE 1:500

JCB Fastrac 2170 and 8m trailer
 Overall Length 10.460m
 Overall Width 2.550m
 Overall Height 2.725m
 Max Traxle Width 2.550m
 Max Traxle Clearance 4.000m
 Lock to Lock Time 10.460m
 Wheel to Wall Turning Radius





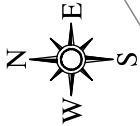
NOTES

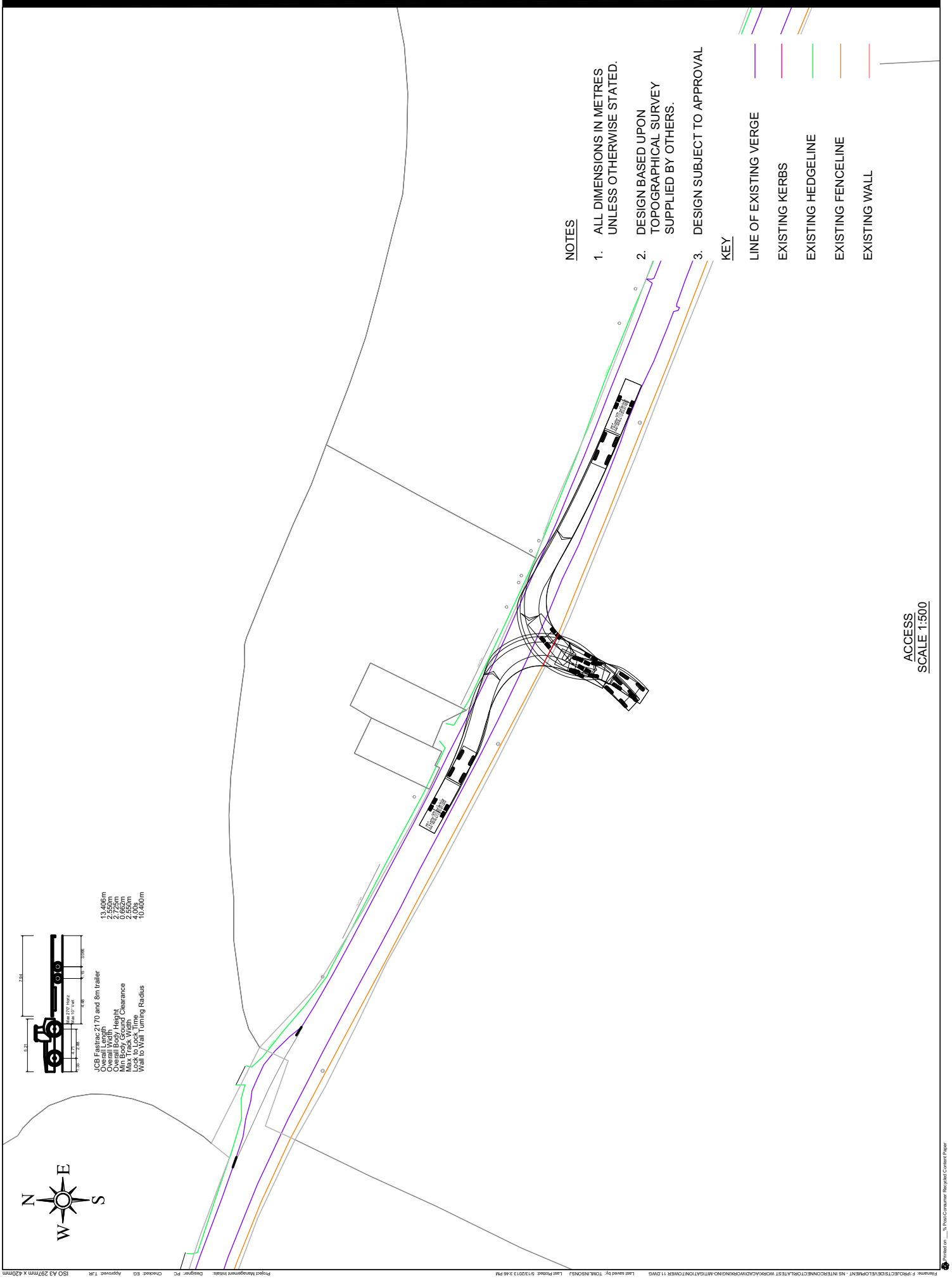
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500





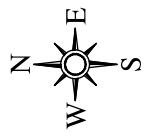
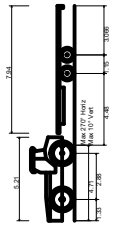
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

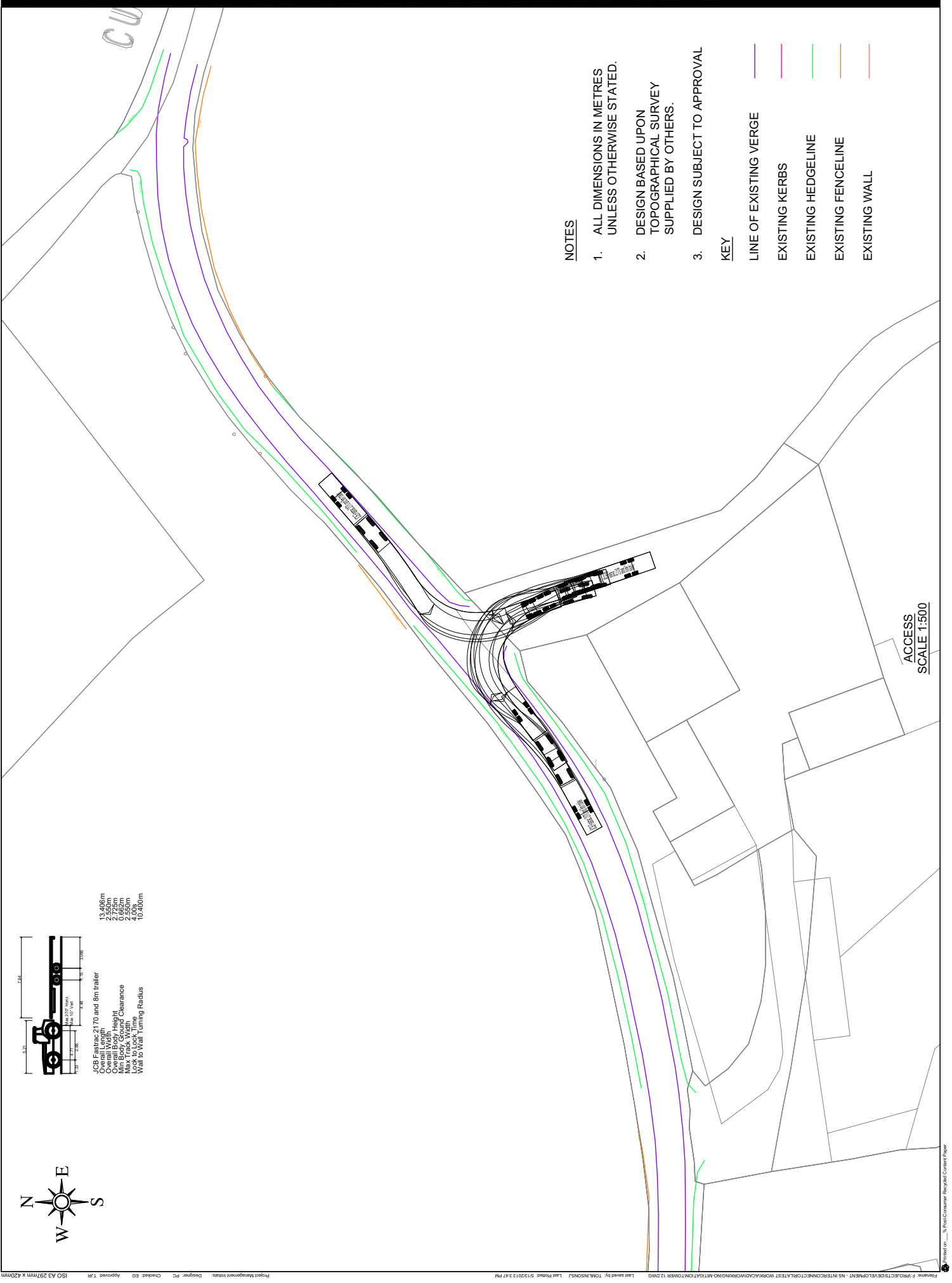
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

JCB Fastrac 2170 and 8m trailer
 Overall Length 7.550m
 Overall Width 2.725m
 Overall Body Height 2.550m
 Max Track Width 4.000m
 Lock to Lock Time 10.400m
 Wheel to Wheel Turning Radius



ACCESS SCALE 1:500



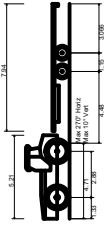
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

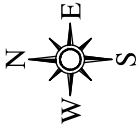
KEY

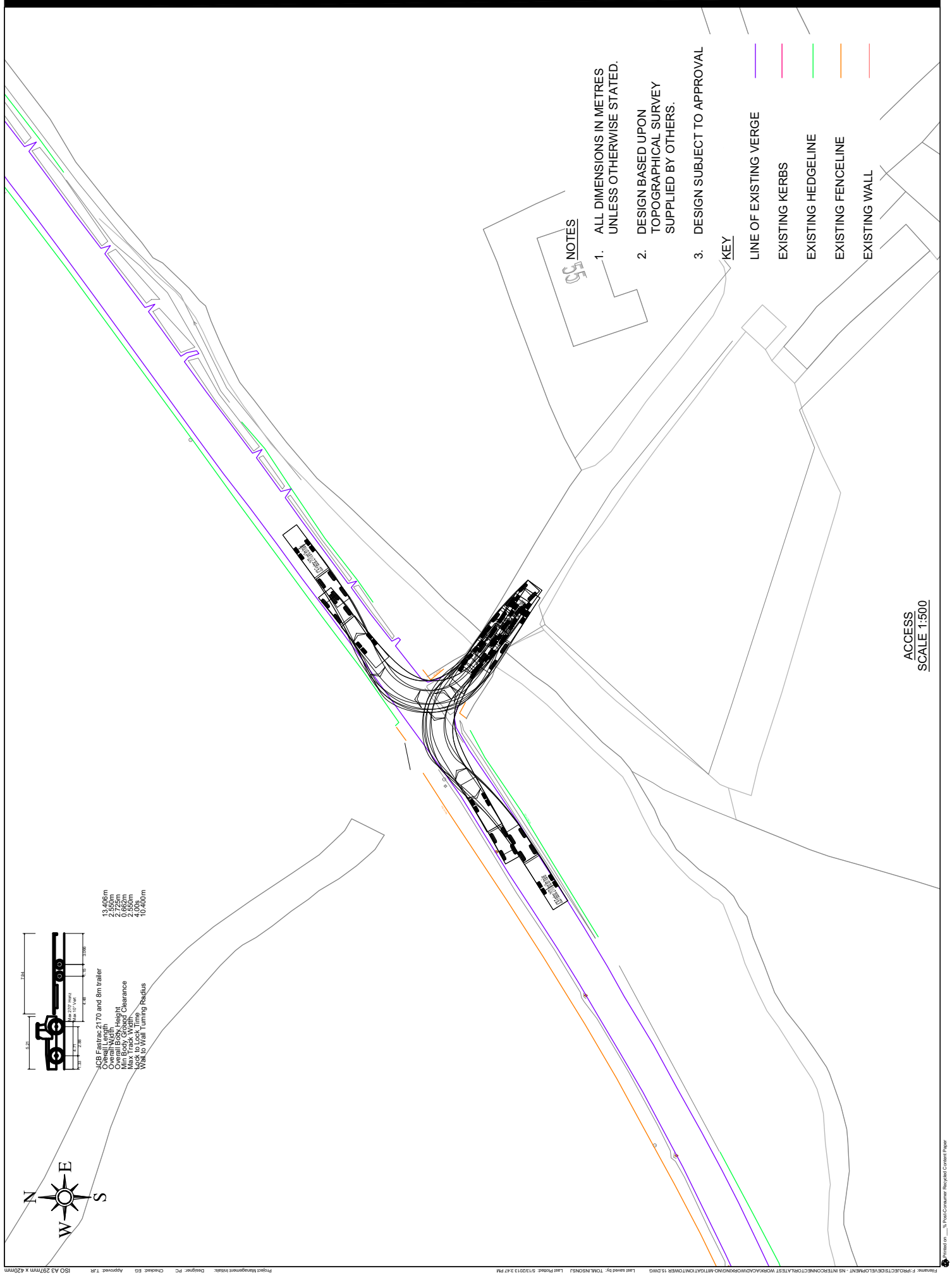
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Frastac 2170 and 8m trailer
 Overall Width 2.54m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Max Height 10.400m
 Max Height 4.000m
 Lock to Lock Time
 Wall to Wall Turning Radius





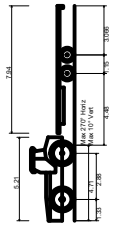
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

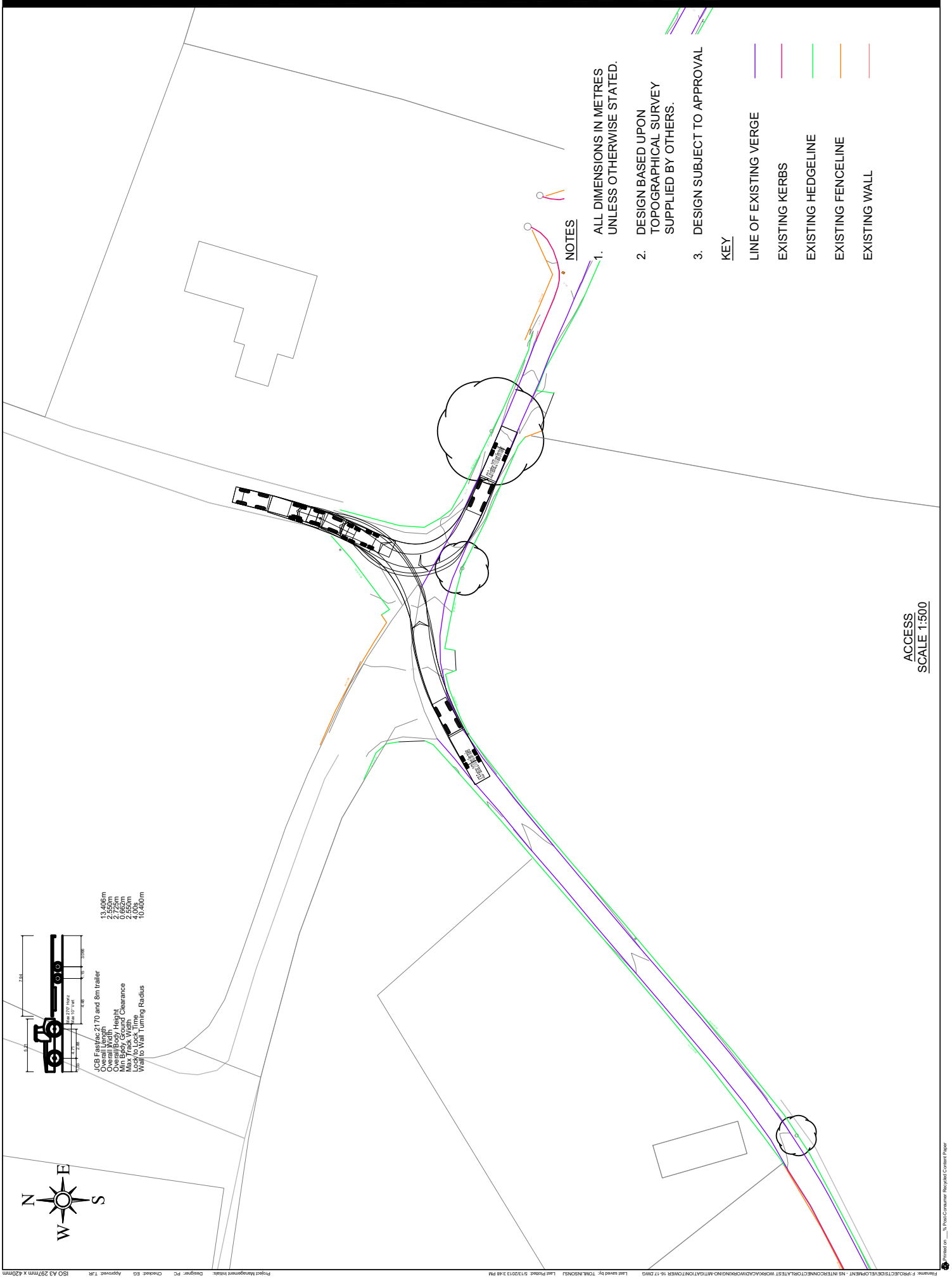
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500

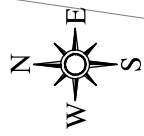
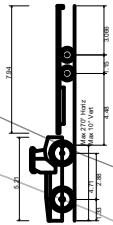


JCB Frastac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Max Clearance 4.000m
 Max Turn Time 10:400m





JCB FastTrac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wheel to Wall Turning Radius 10.400m



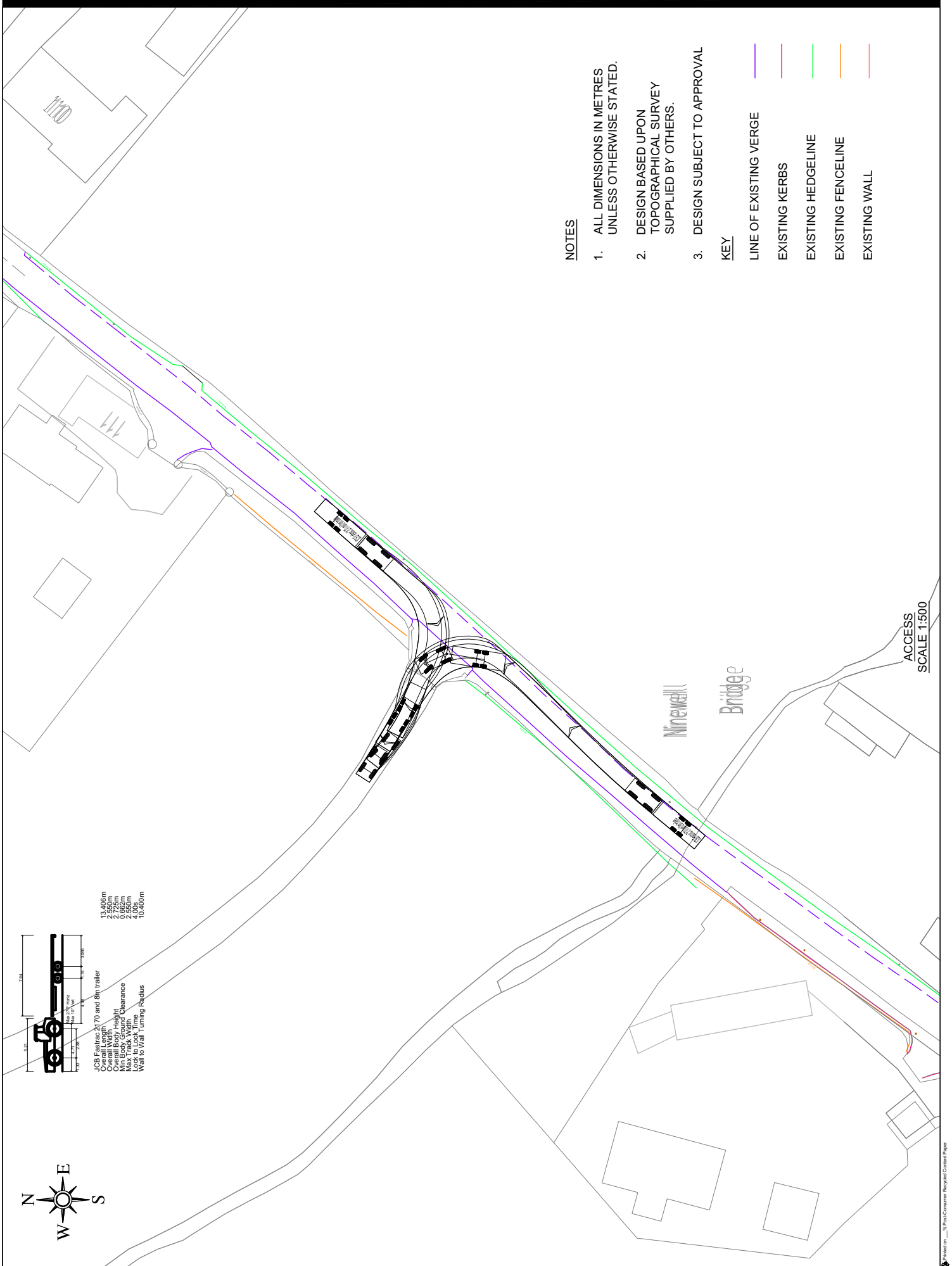
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



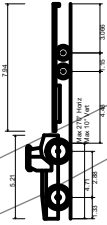
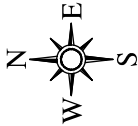
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

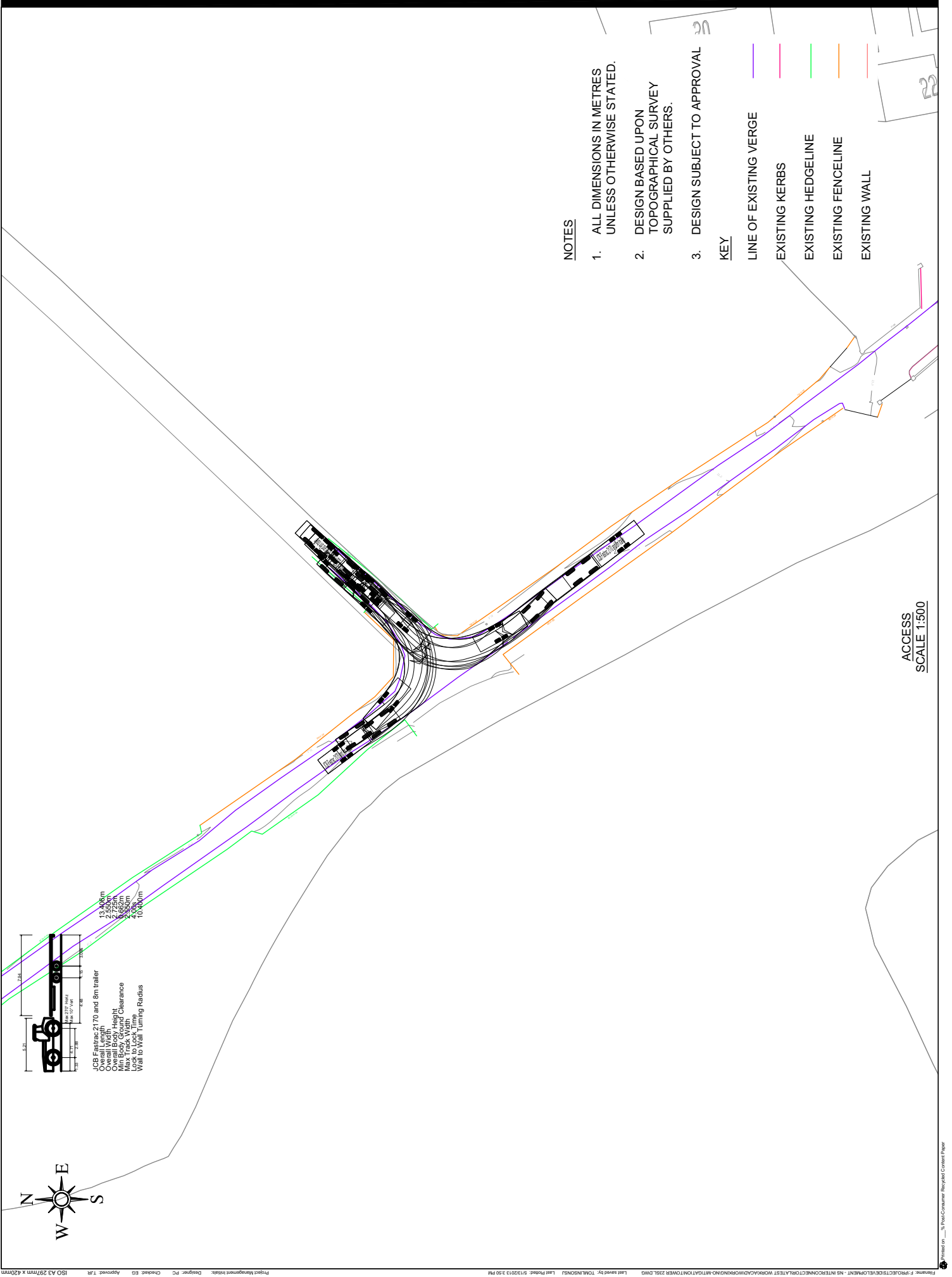
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500



JCB Frastrac 2170 and 8m trailer
 Overall Width 2.540m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wheel to Wheel Turning Radius 10.400m



NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.

2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.

3. DESIGN SUBJECT TO APPROVAL

KEY

LINE OF EXISTING VERGE

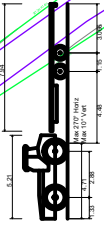
EXISTING KERBS

EXISTING HEDGELINE

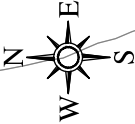
EXISTING FENCELINE

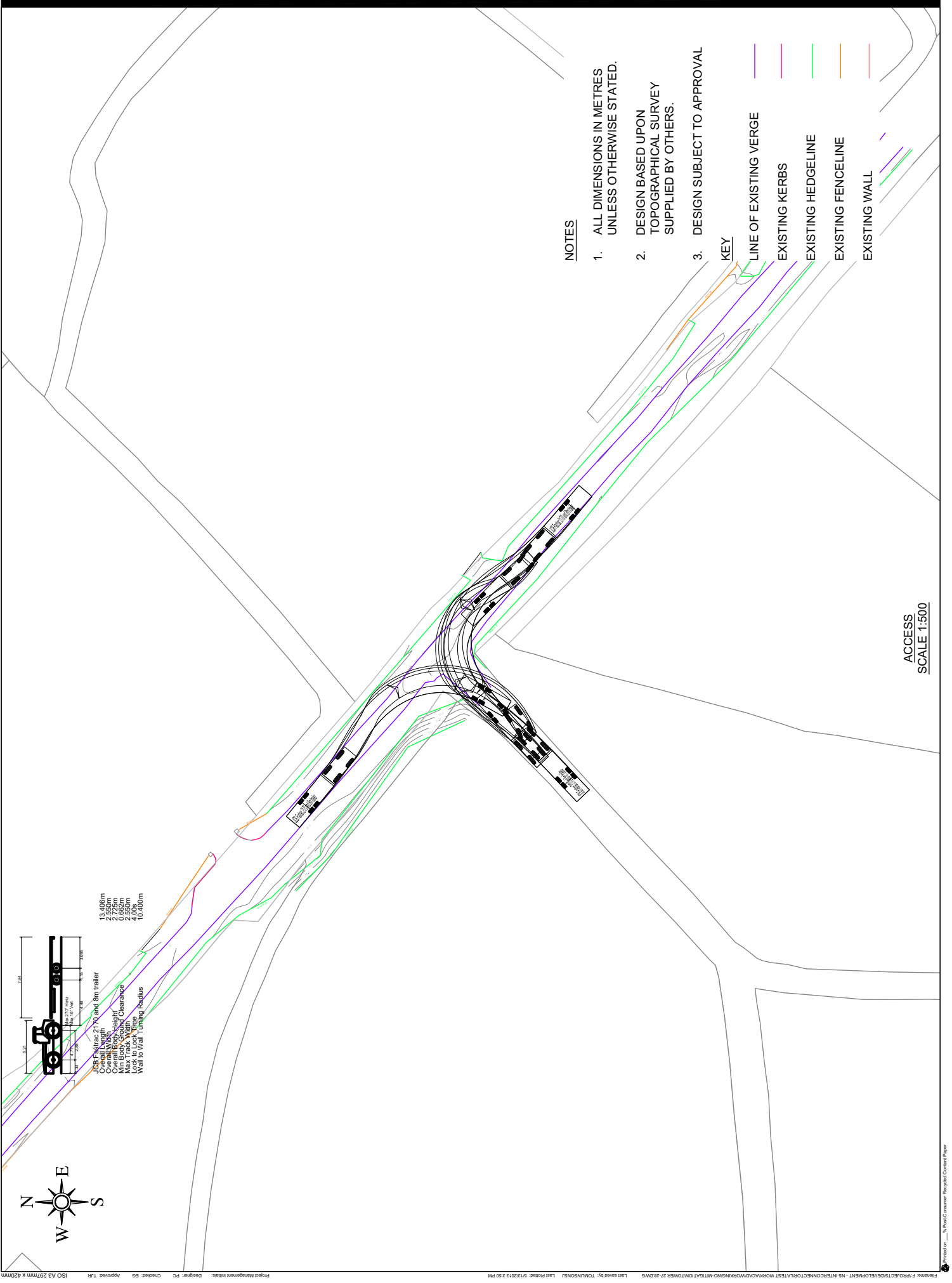
EXISTING WALL

ACCESS
SCALE 1:500



JCB Fratrac 2170 and 8m trailer
 Overall Length 5.97m
 Overall Width 2.64m
 Overall Body Height 1.78m
 Overall Height to Top of Body 4.30m
 Max Track Width 1.78m
 Max Wheelbase 4.30m
 Max Turning Radius 10.00m





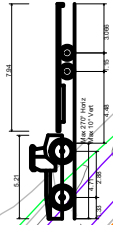
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

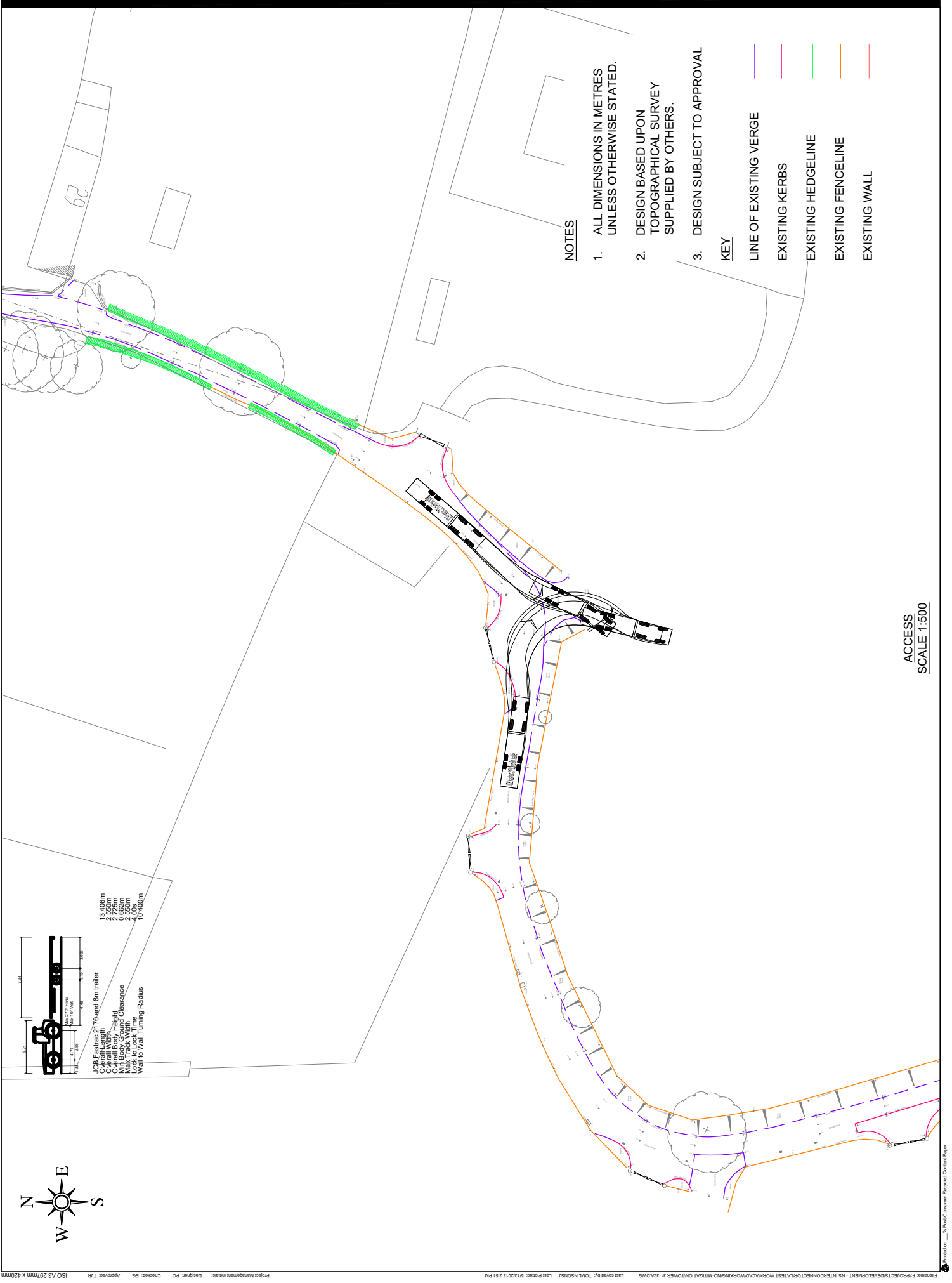
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



21.70m x 8m trailer
 Overall Length
 Overall Width
 Overall Body Height
 Max Track Width
 Max Track Clearance
 Lock to Lock Time
 Wheel to Wheel Turning Radius





NOTES

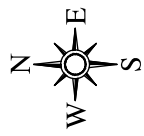
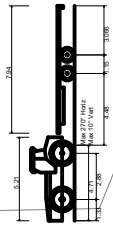
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

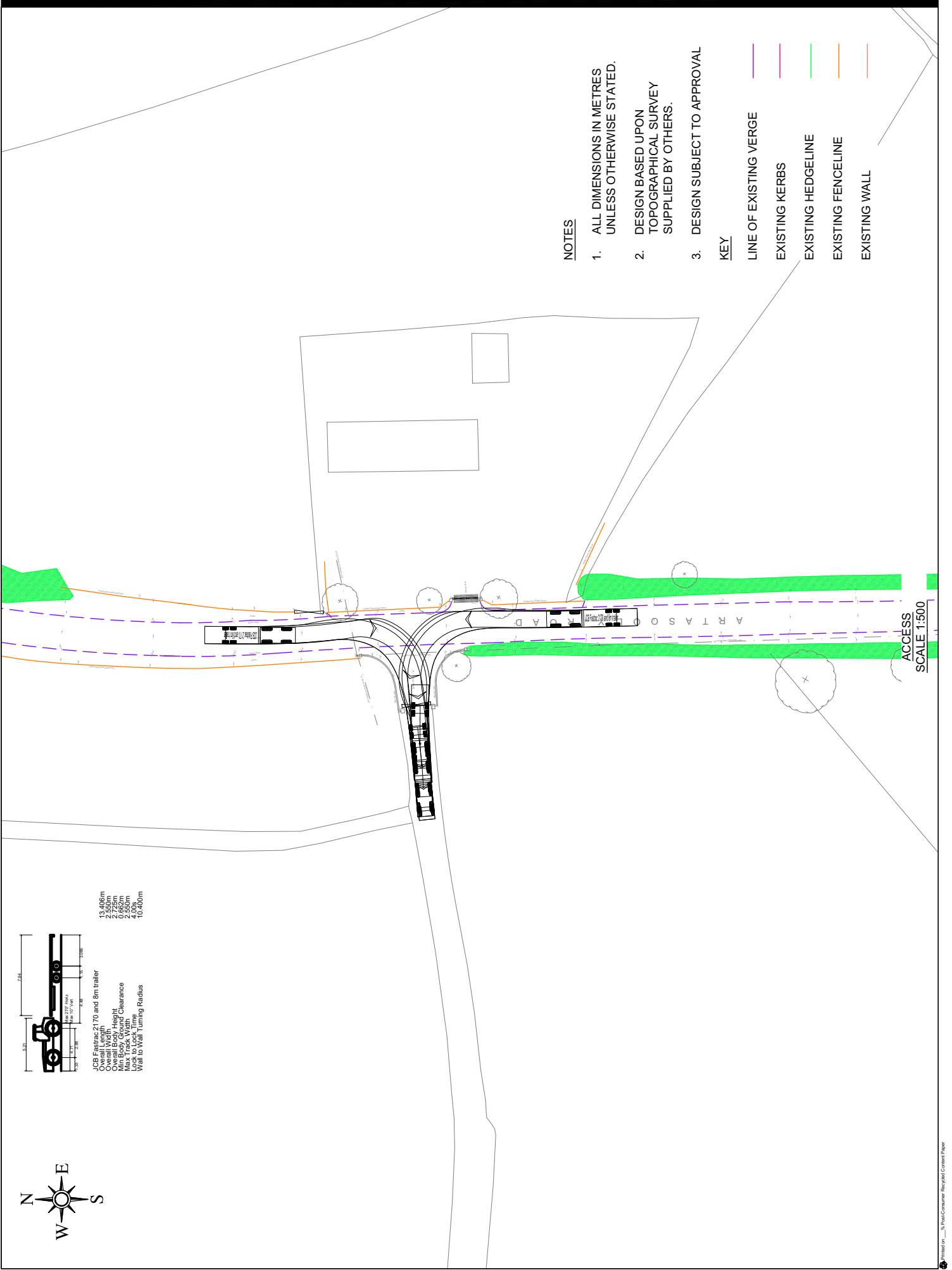
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500

JCB Fastrac 2170 and 8m trailer
 Overall Length 13.465m
 Overall Width 2.550m
 Overall Body Height 2.725m
 Overall Body and Clearance 2.550m
 Max Track Width 4.00m
 Lock to Lock Time 10.400s
 Wheel to Wall Turning Radius 10.400m





NOTES

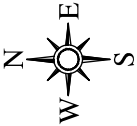
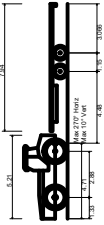
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

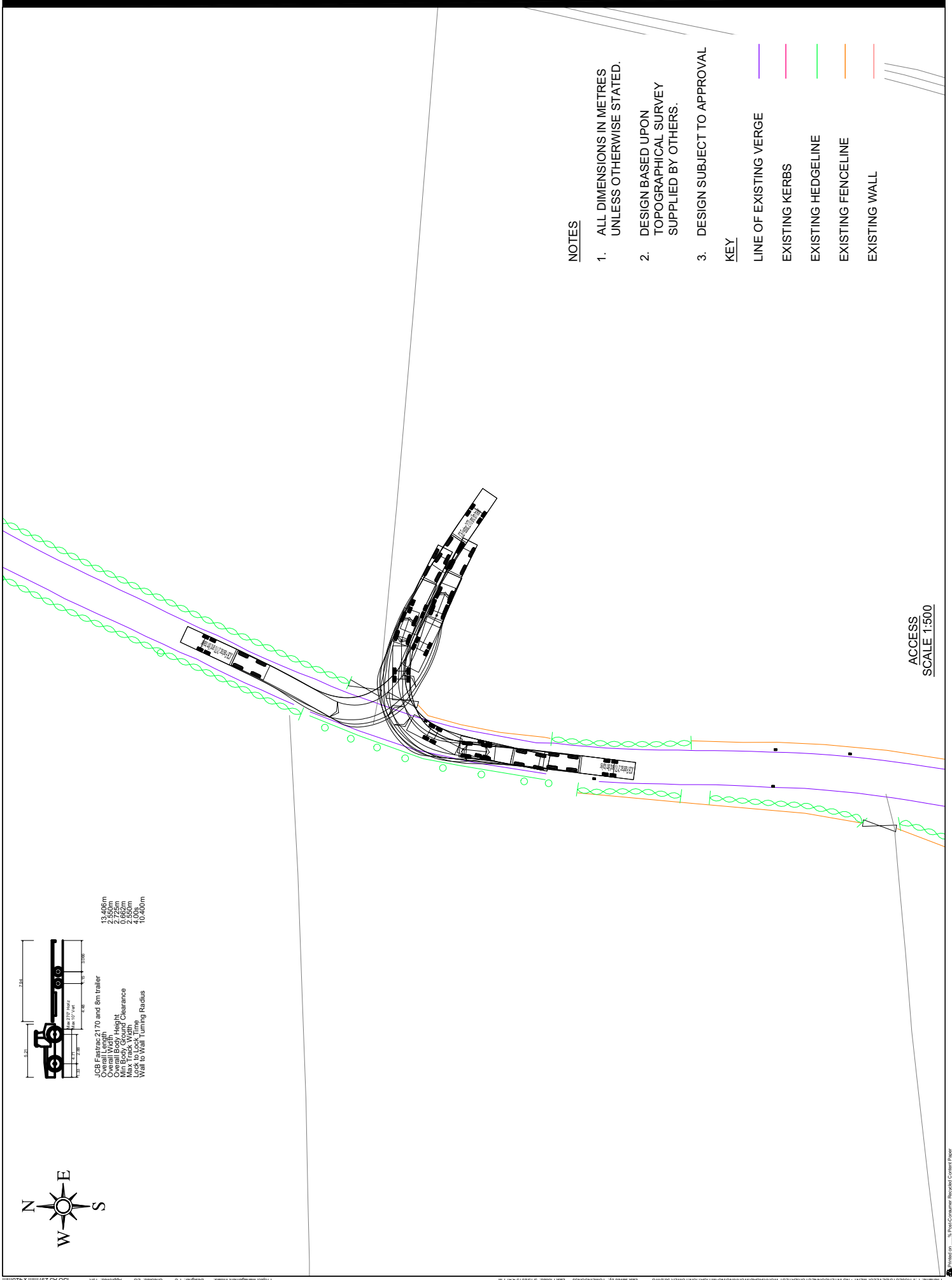
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500

JCB Fastrac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wheel to Wheel Turning Radius 10.400m





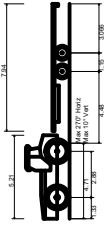
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

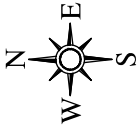
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

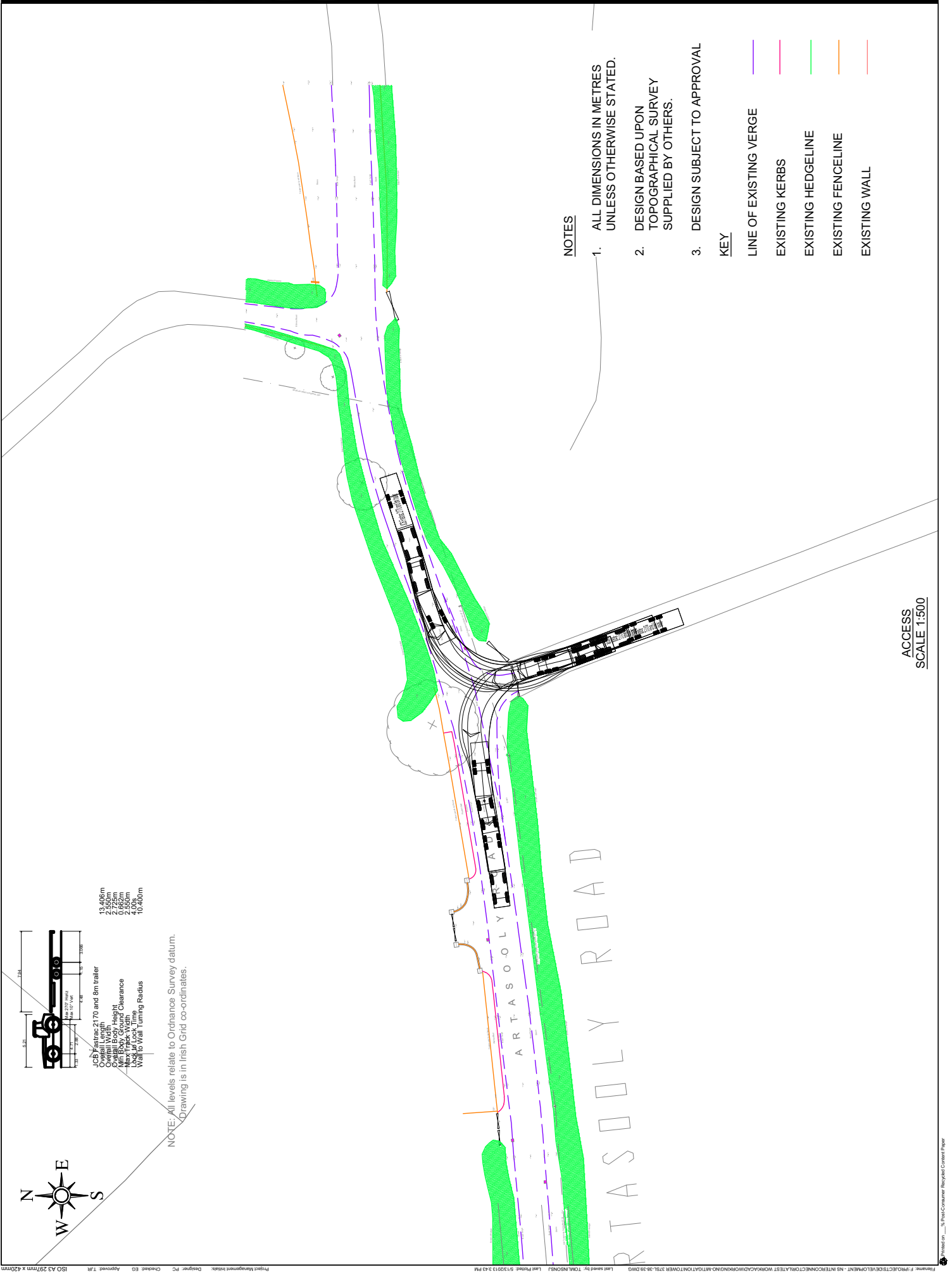
ACCESS
SCALE 1:500



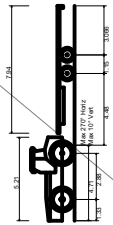
JCB Fasttrac 2170 and 8m trailer
 Overall Length 10,300mm
 Overall Width 2,550mm
 Overall Body Height 2,725mm
 Max Track Width 2,550mm
 Lock to Lock Time 4,000mm
 Wall to Wall Turning Radius 10,400mm



TYRONE - CAVAN INTERCONNECTOR



13,465m
 Overall Height
 7,550m
 Overall Width
 2,725m
 Overall Body Height
 2,550m
 Overall Body Width
 2,550m
 Max. Tip Clearance
 4,000m
 Lock Up Time
 10,400m



NOTE: All levels relate to Ordnance Survey datum.
 Drawing is in Irish Grid co-ordinates.

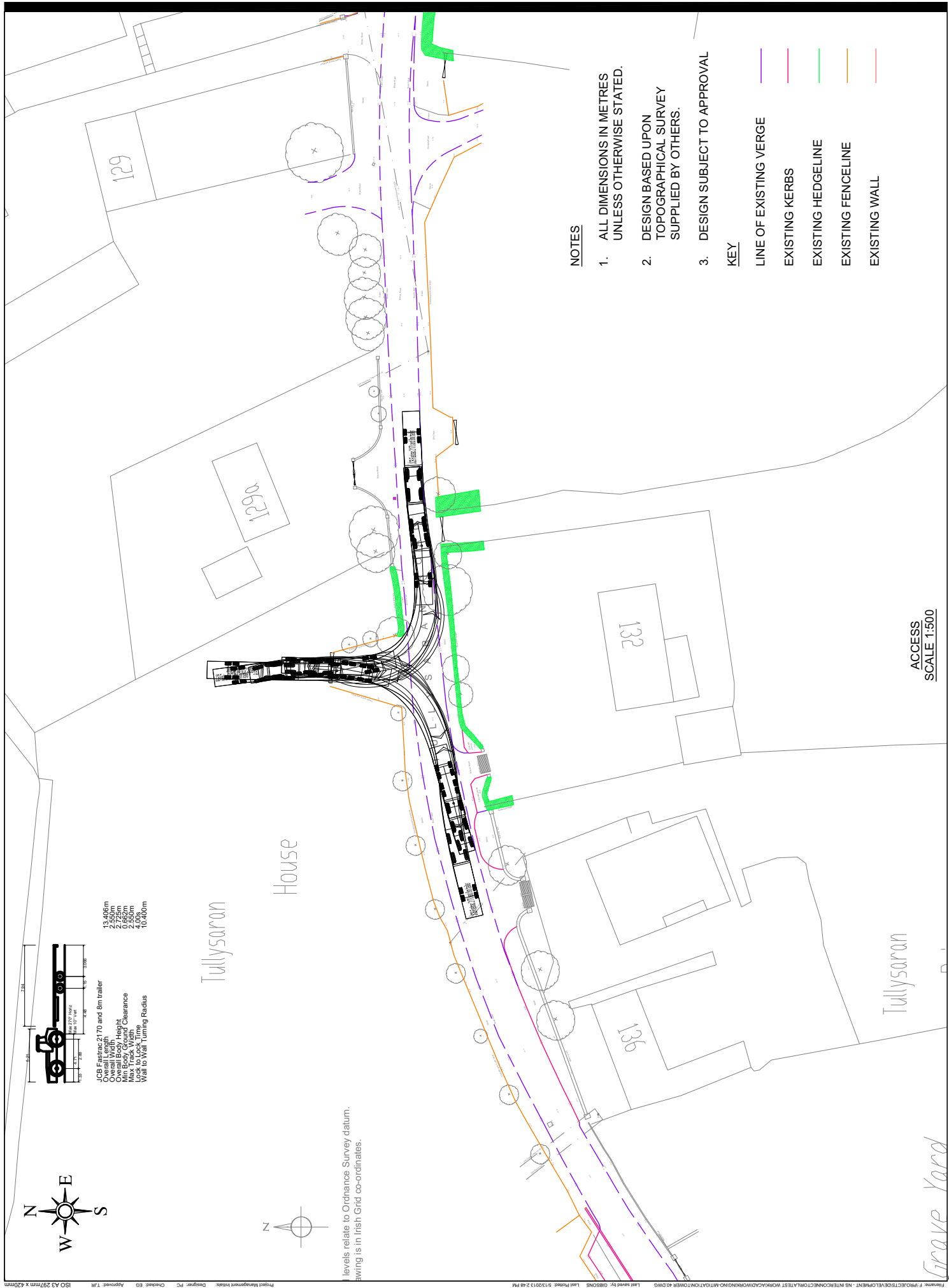
NOTES

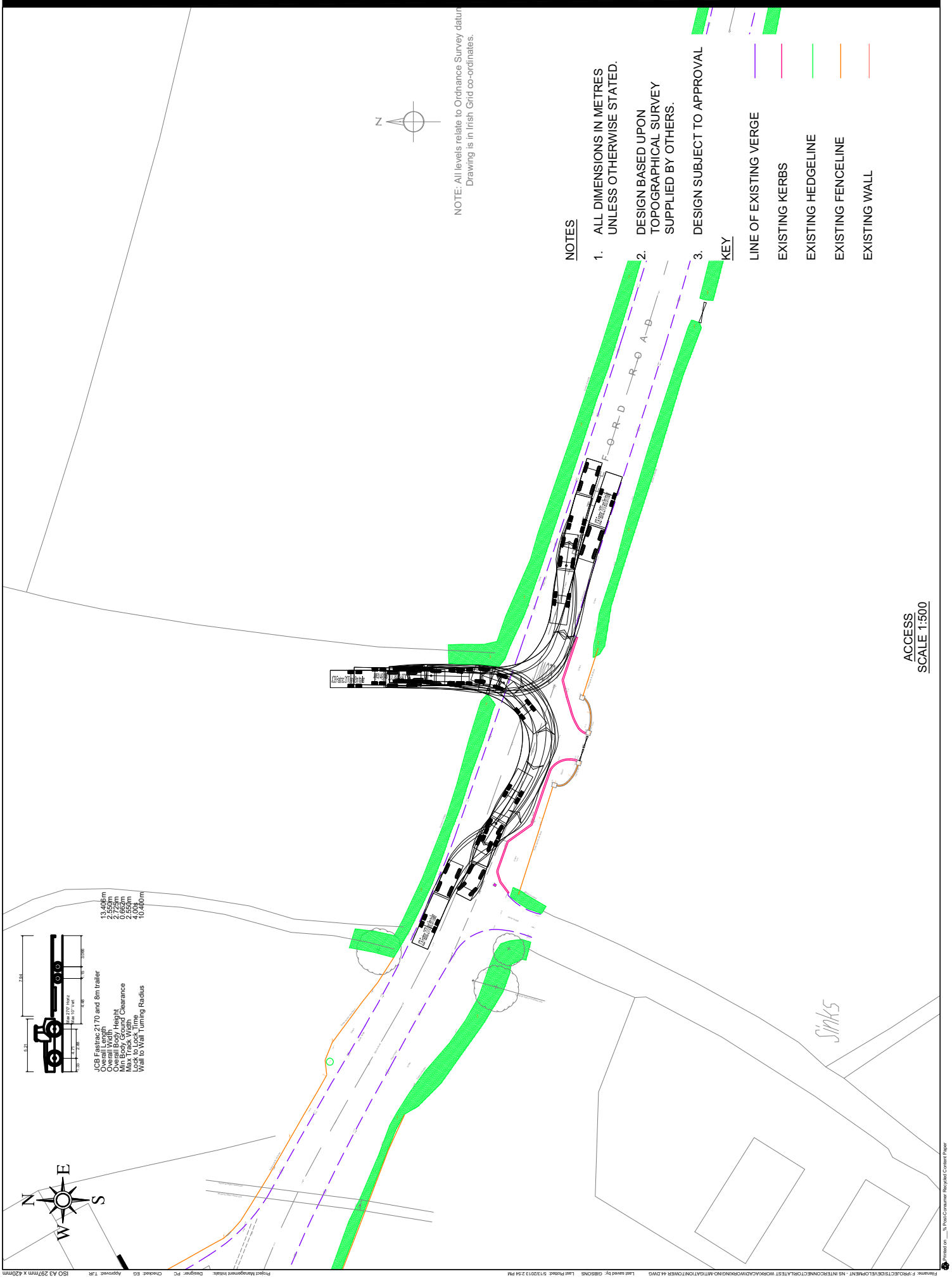
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
 SCALE 1:500





NOTE: All levels relate to Ordnance Survey datum
Drawing is in Irish Grid co-ordinates.

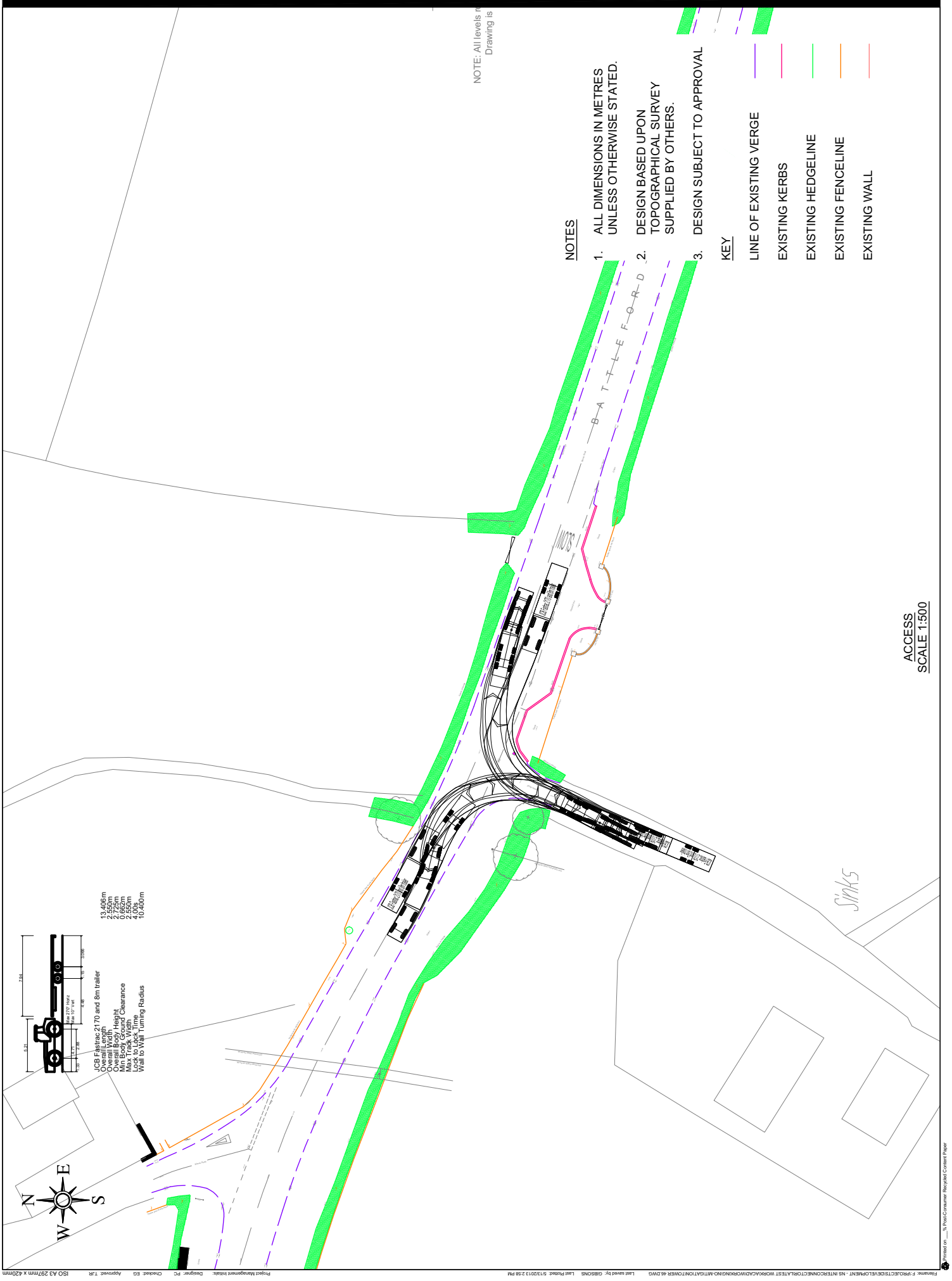
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

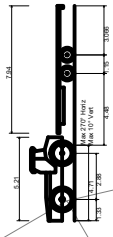
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Flastrac 2170 and 8m trailer
 Overall Width: 2.550m
 Overall Height: 2.725m
 Max Track Width: 2.550m
 Max Turn Radius: 4.00m
 Max Turn Radius: 10.400m



NOTES

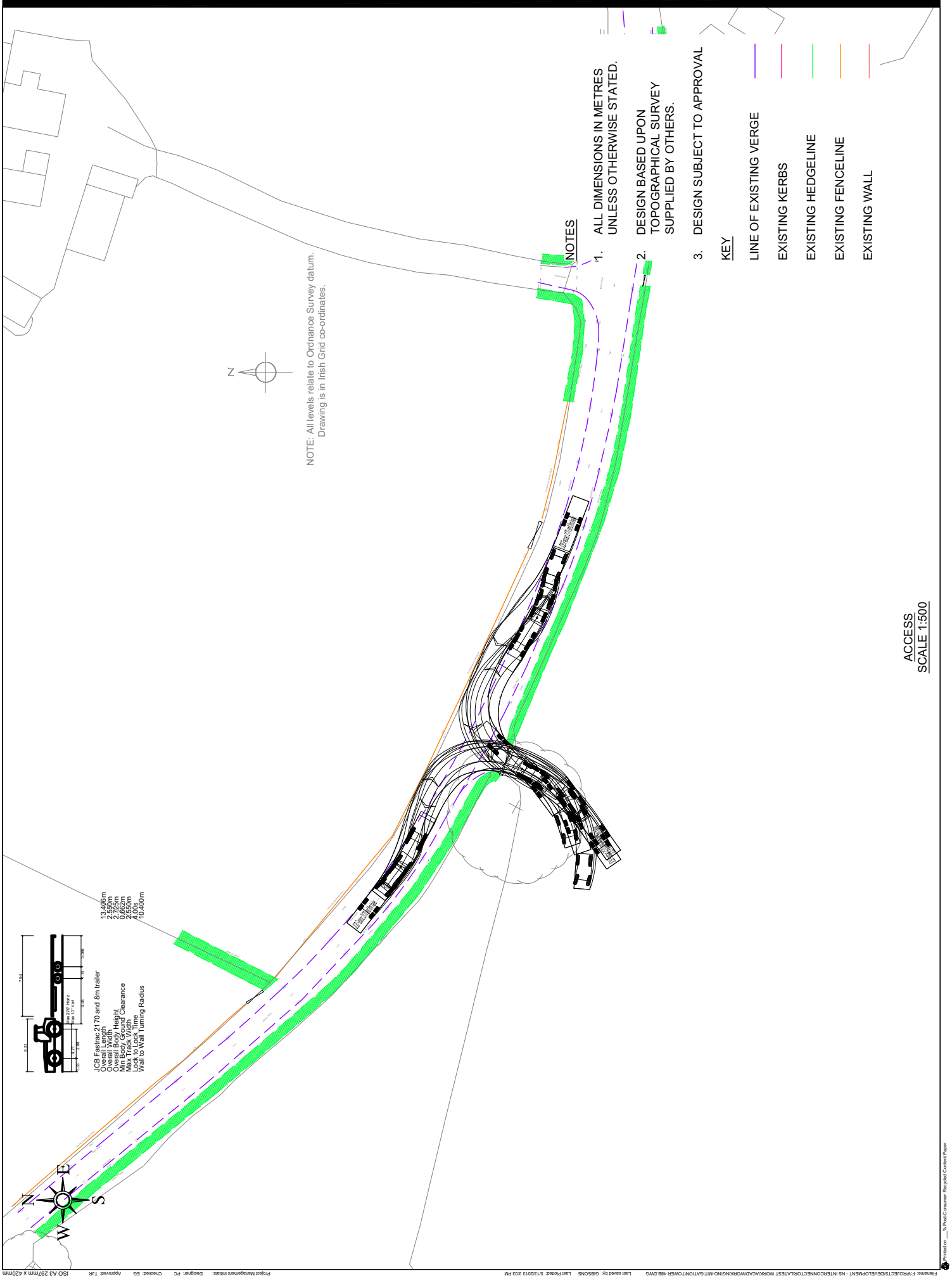
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

NOTE: All levels in Drawing is

ACCESS SCALE 1:500



NOTE: All levels relate to Ordnance Survey datum.
Drawing is in Irish Grid co-ordinates.

NOTES

1. ALL DIMENSIONS IN METRES
UNLESS OTHERWISE STATED.

2. DESIGN BASED UPON
TOPOGRAPHICAL SURVEY
SUPPLIED BY OTHERS.

3. DESIGN SUBJECT TO APPROVAL

KEY

LINE OF EXISTING VERGE

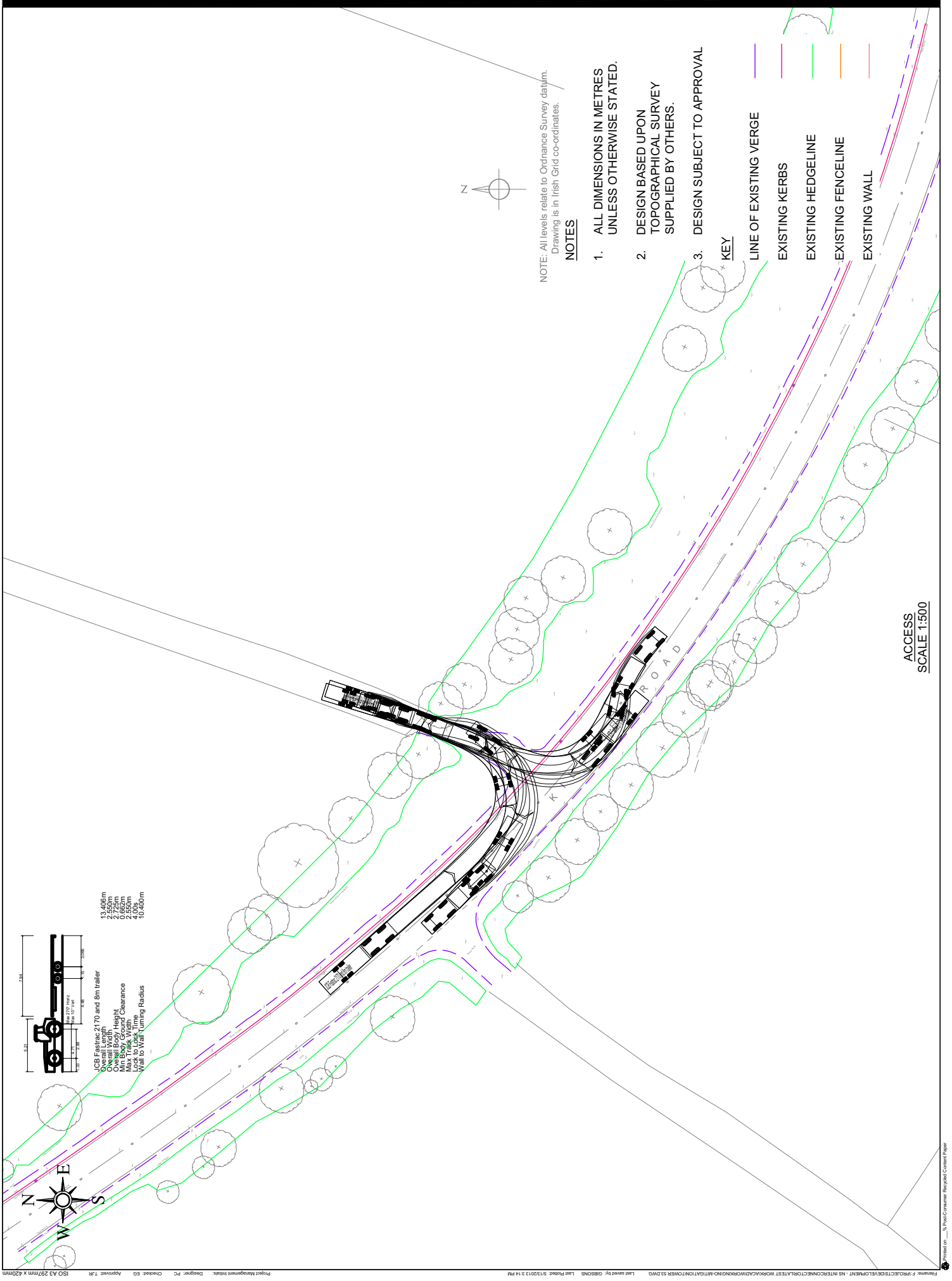
EXISTING KERBS

EXISTING HEDGELINE

EXISTING FENCELINE

EXISTING WALL

ACCESS
SCALE 1:500



NOTE: All levels relate to Ordnance Survey datum.
Drawing is in Irish Grid co-ordinates.

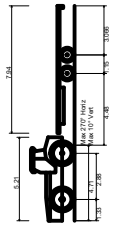
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

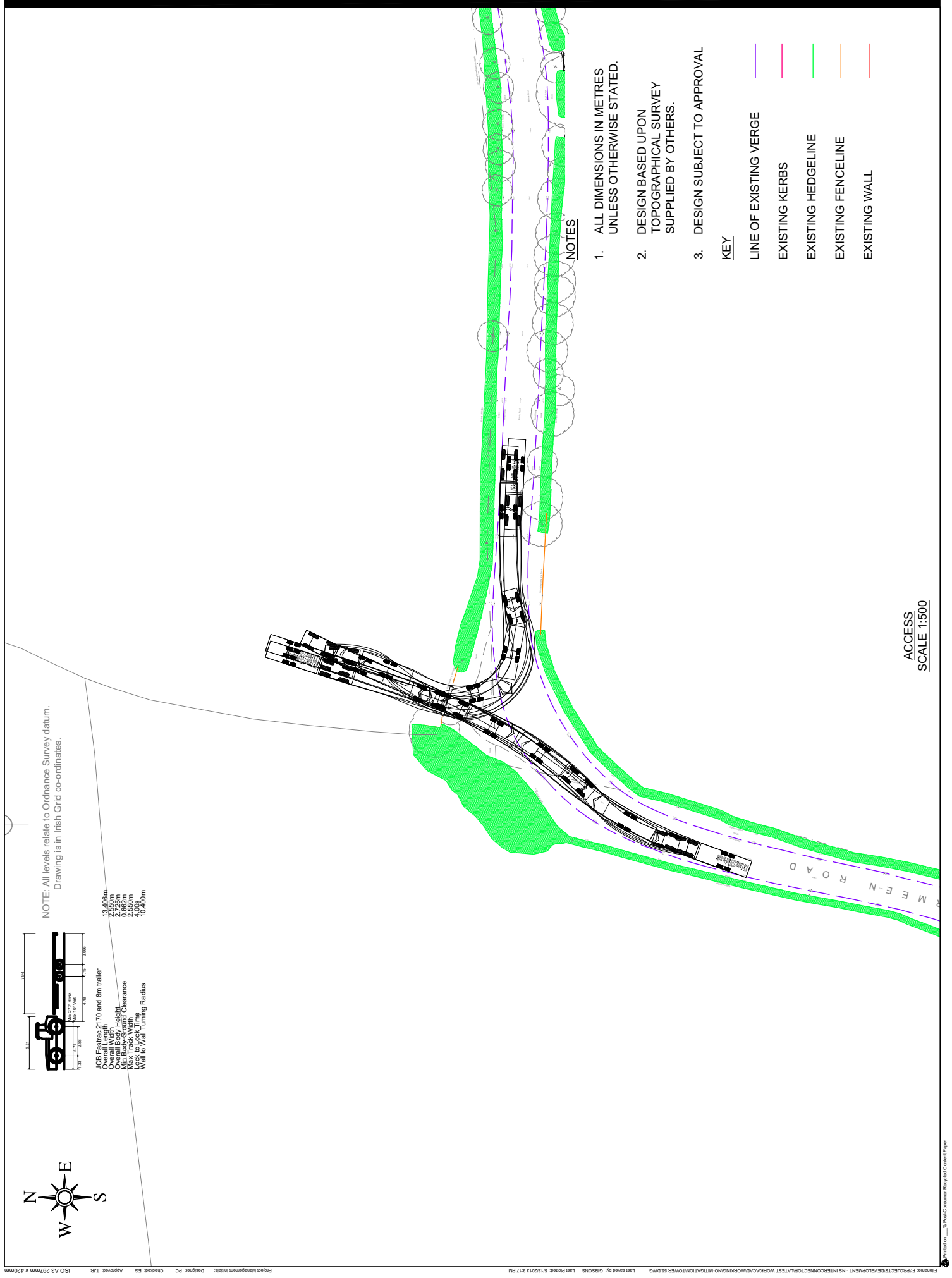
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Fastrac 2170 and 8m trailer
Overall Height 2.54m
Overall Width 0.97m
Overall Body Height 2.725m
Overall Body Width 2.550m
Max Track Width 2.550m
Look to Lock Time 4.00s
Wall to Wall Turning Radius 10.400m





NOTE: All levels relate to Ordnance Survey datum.
Drawing is in Irish Grid co-ordinates.

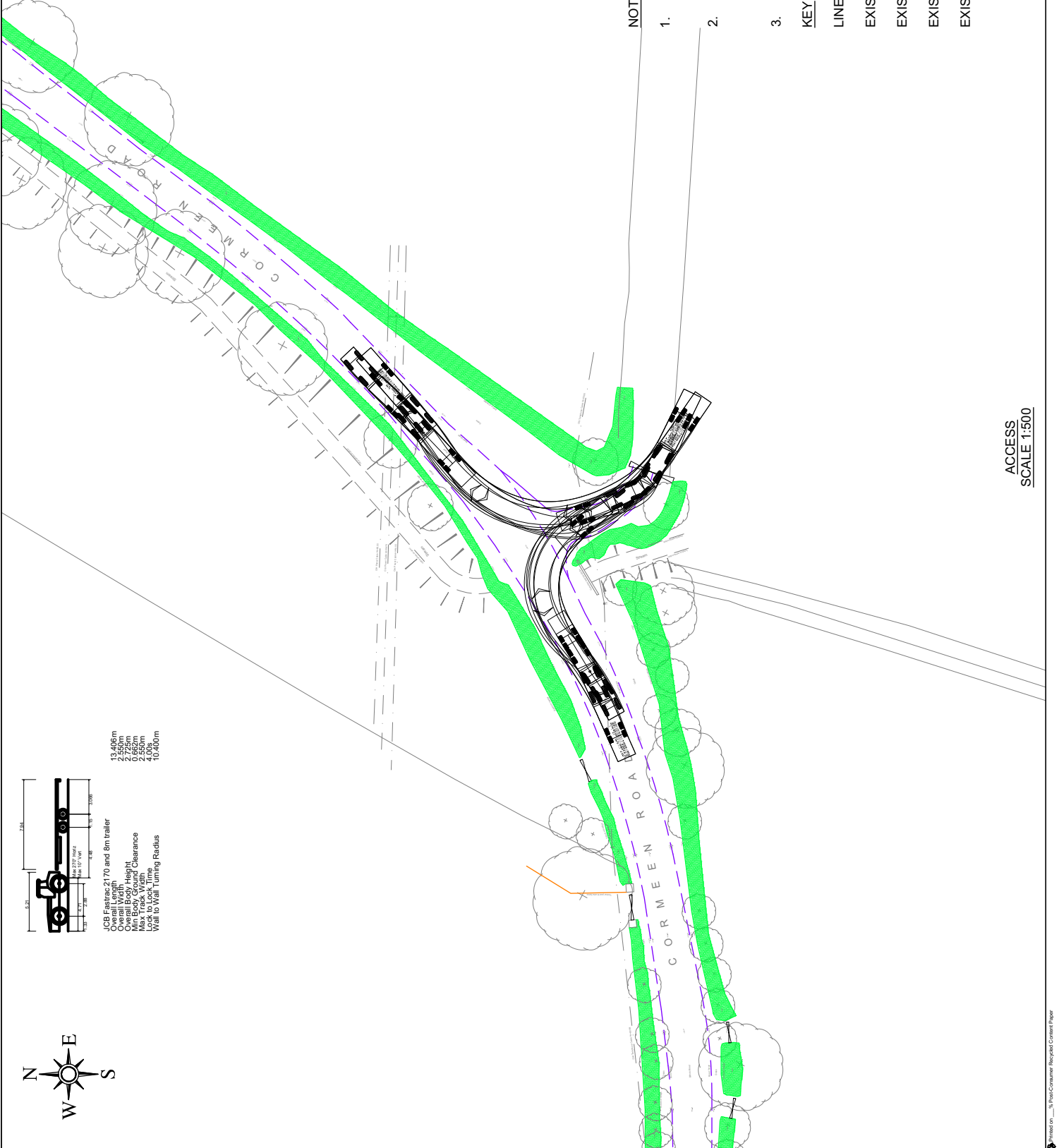
JCB Frastac 2170 and 8m trailer
 Overall Length 7.550m
 Overall Width 2.725m
 Overall Height 2.550m
 Max Track Width 4.00m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius

NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

- KEY**
- LINE OF EXISTING VERGE
 - EXISTING KERBS
 - EXISTING HEDGELINE
 - EXISTING FENCELINE
 - EXISTING WALL

ACCESS
SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Length 10.400m
 Overall Width 2.550m
 Overall Height 2.725m
 Max Track Width 2.550m
 Max Turn Radius 10.400m
 Max Turn Speed 4.000m/s
 Lock to Lock Time
 Walk to Wall
 Turning Radius

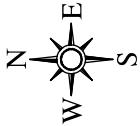
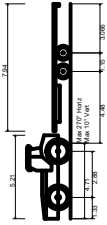
NOTES

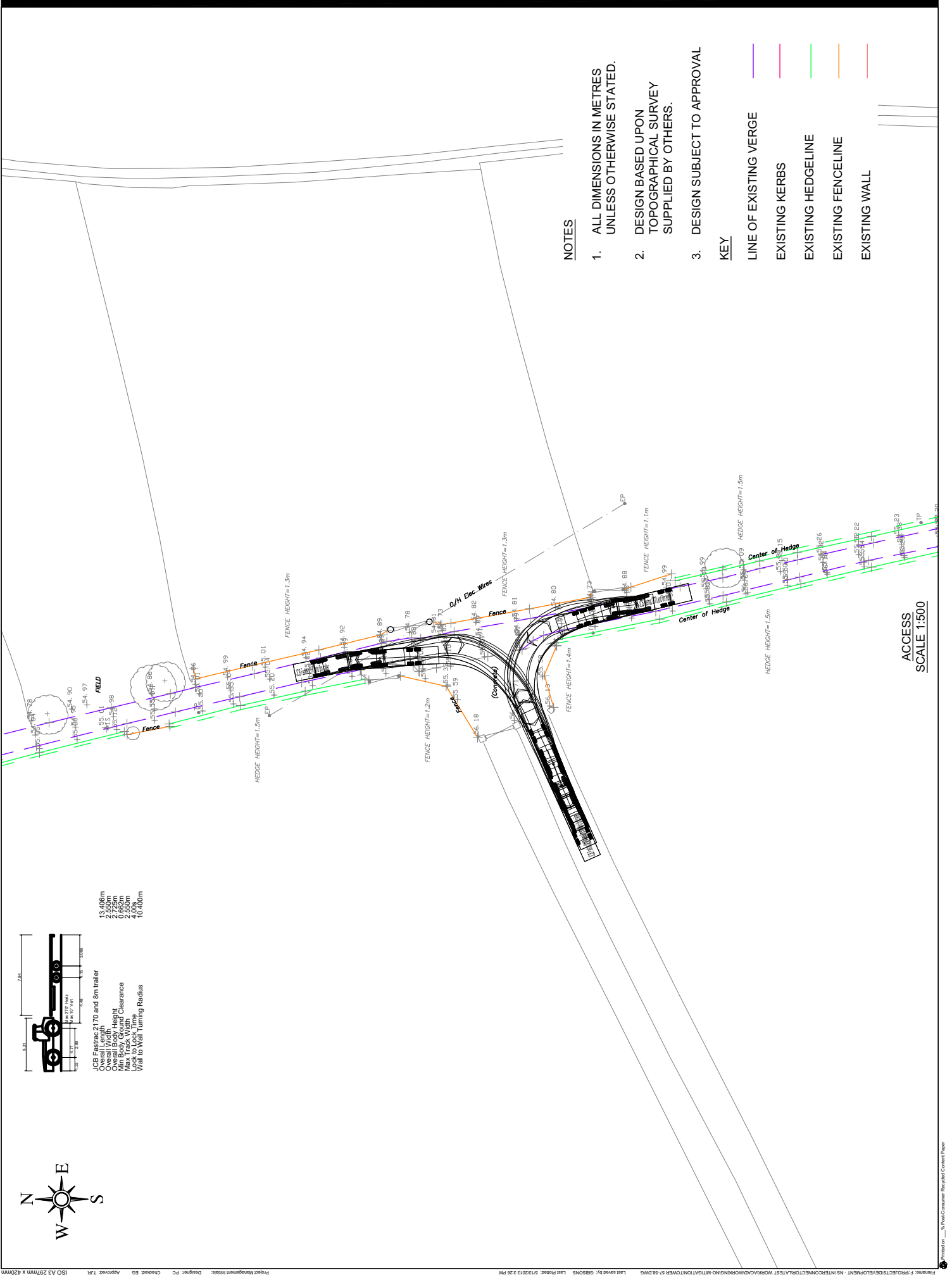
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500





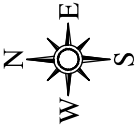
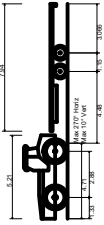
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

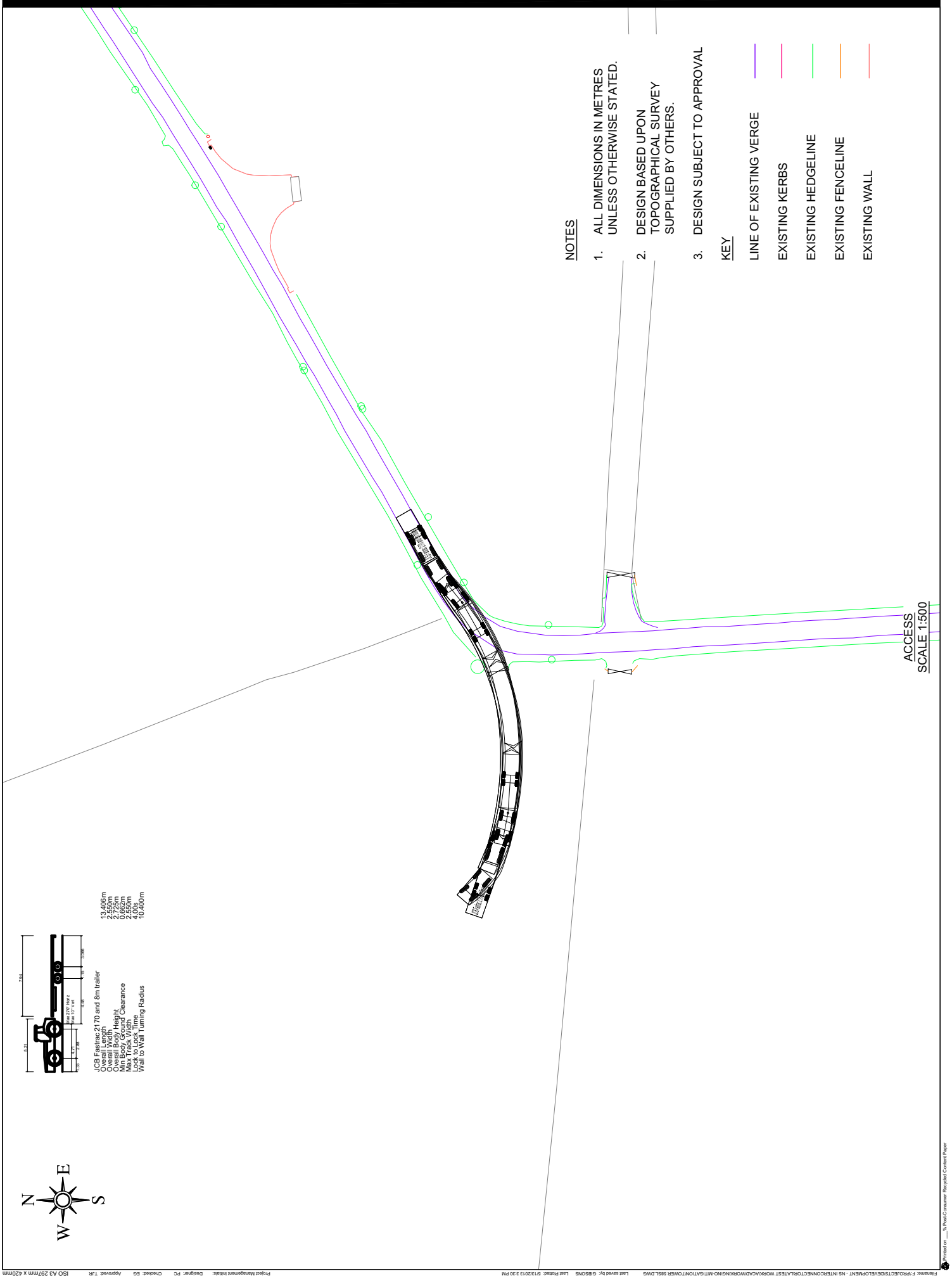
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL

JCB Fastrac 2170 and 8m trailer
 Overall Length 10.460m
 Overall Width 2.550m
 Overall Height 2.725m
 Max. Track Width 2.550m
 Lock to Lock Time 4.000s
 Wall to Wall Turning Radius 10.460m



ACCESS SCALE 1:500



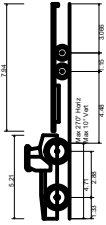
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

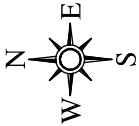
KEY

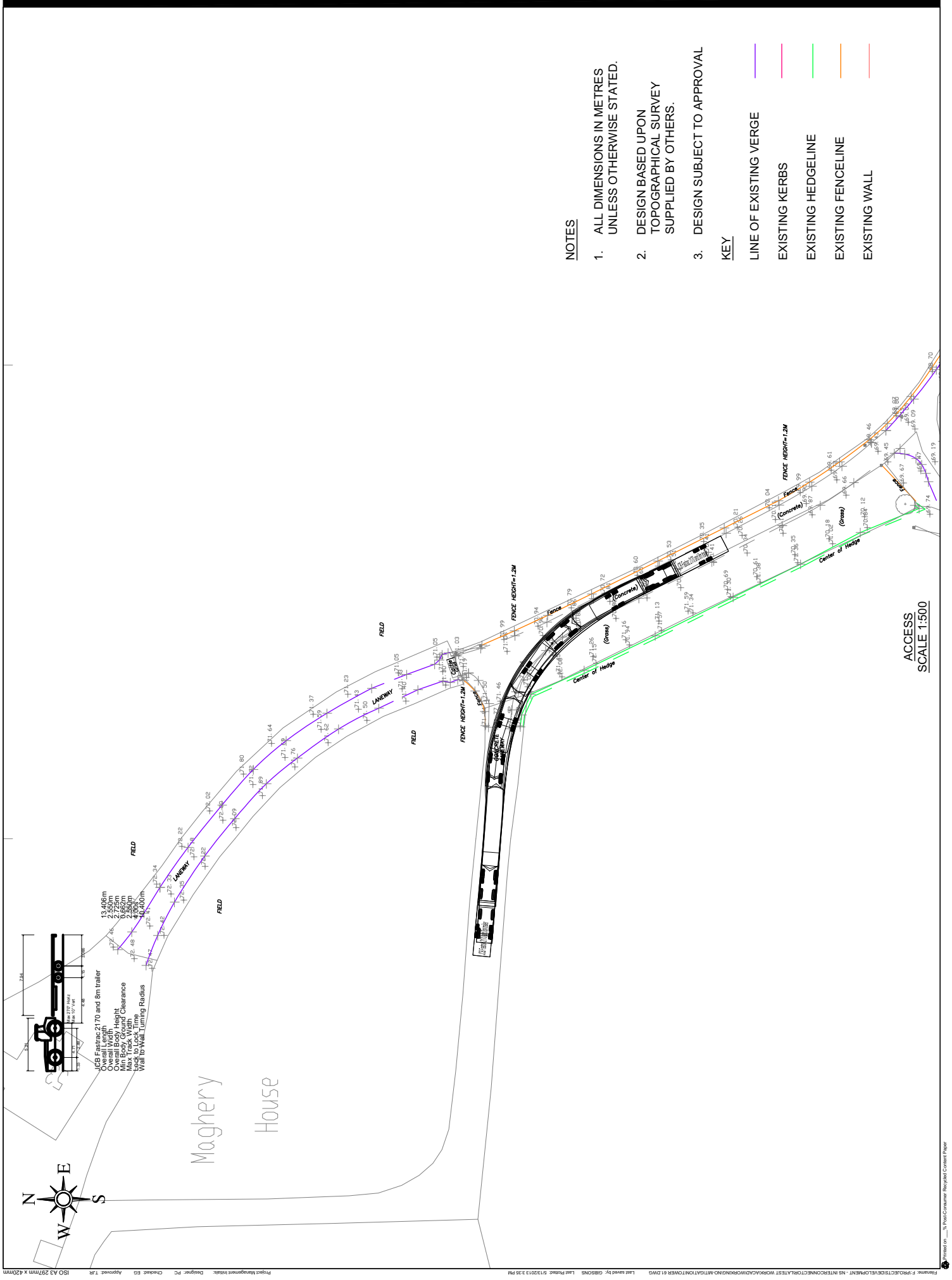
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Frastac 2170 and 8m trailer
 Overall Height 2.54m
 Overall Width 2.74m
 Overall Body Height 2.725m
 Overall Body Width 2.550m
 Max Track Width 4.00m
 Lock to Lock Time 10.00m
 Trail to Trail Turning Radius 10.400m





NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

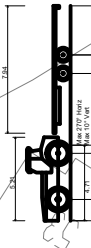
KEY

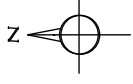
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Width
 Overall Body Height
 Overall Body Clearance
 Max Track Width
 Max Track Height
 Max Track Clearance
 Max Track Radius





NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

KEY

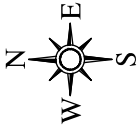
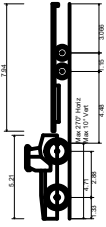
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

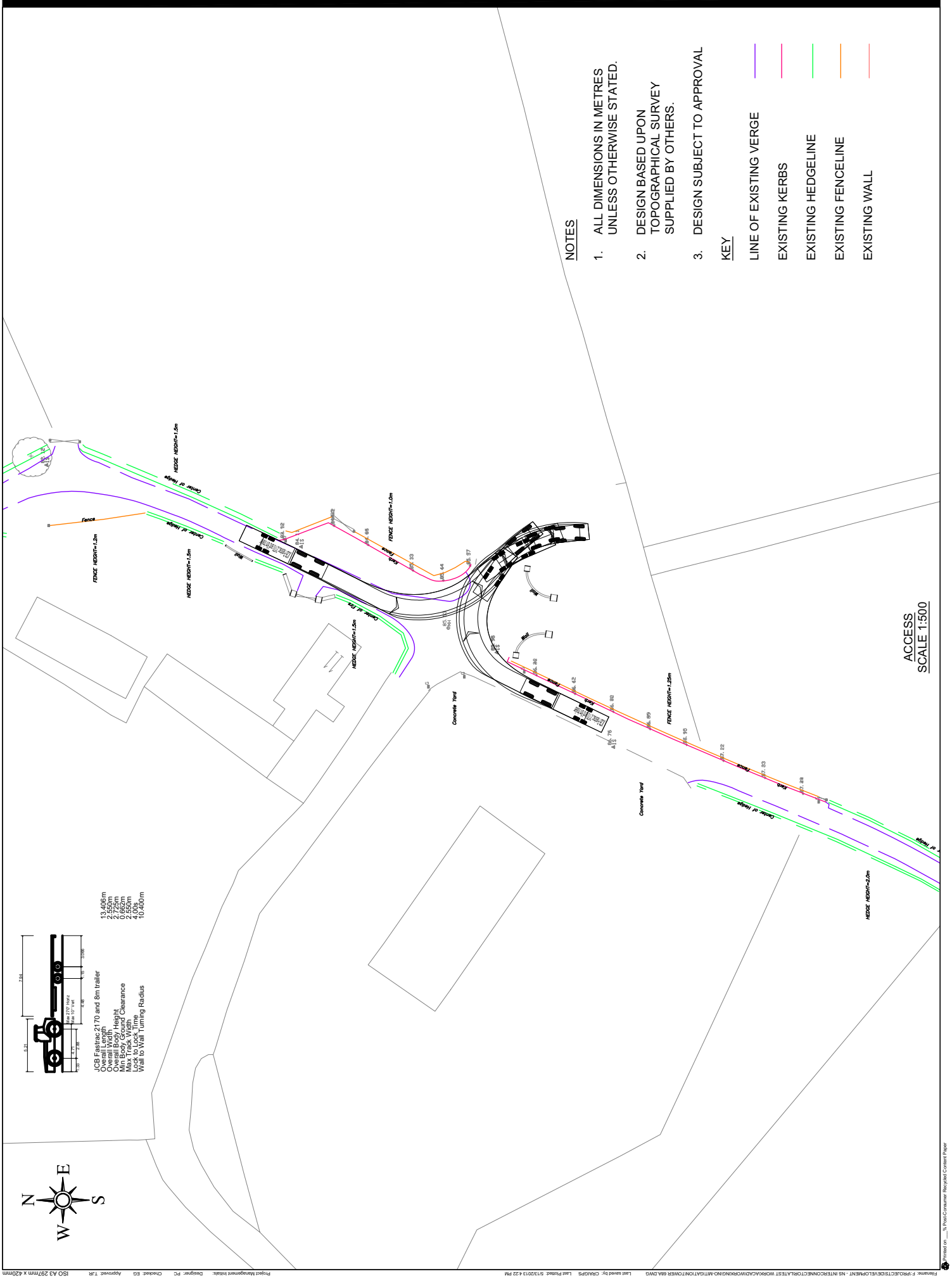
ACCESS SCALE 1:500

DERRIGALLY WAY

PROTOTYPALLY ROAD

- JCB Fastrac 2170 and 8m trailer
- Overall Length 10.465m
- Overall Width 2.550m
- Overall Height 2.725m
- Max Track Width 2.550m
- Lock to Lock Time 4.00s
- Wall to Wall Turning Radius 10.400m



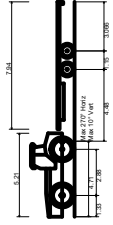


NOTES

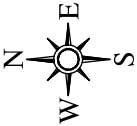
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

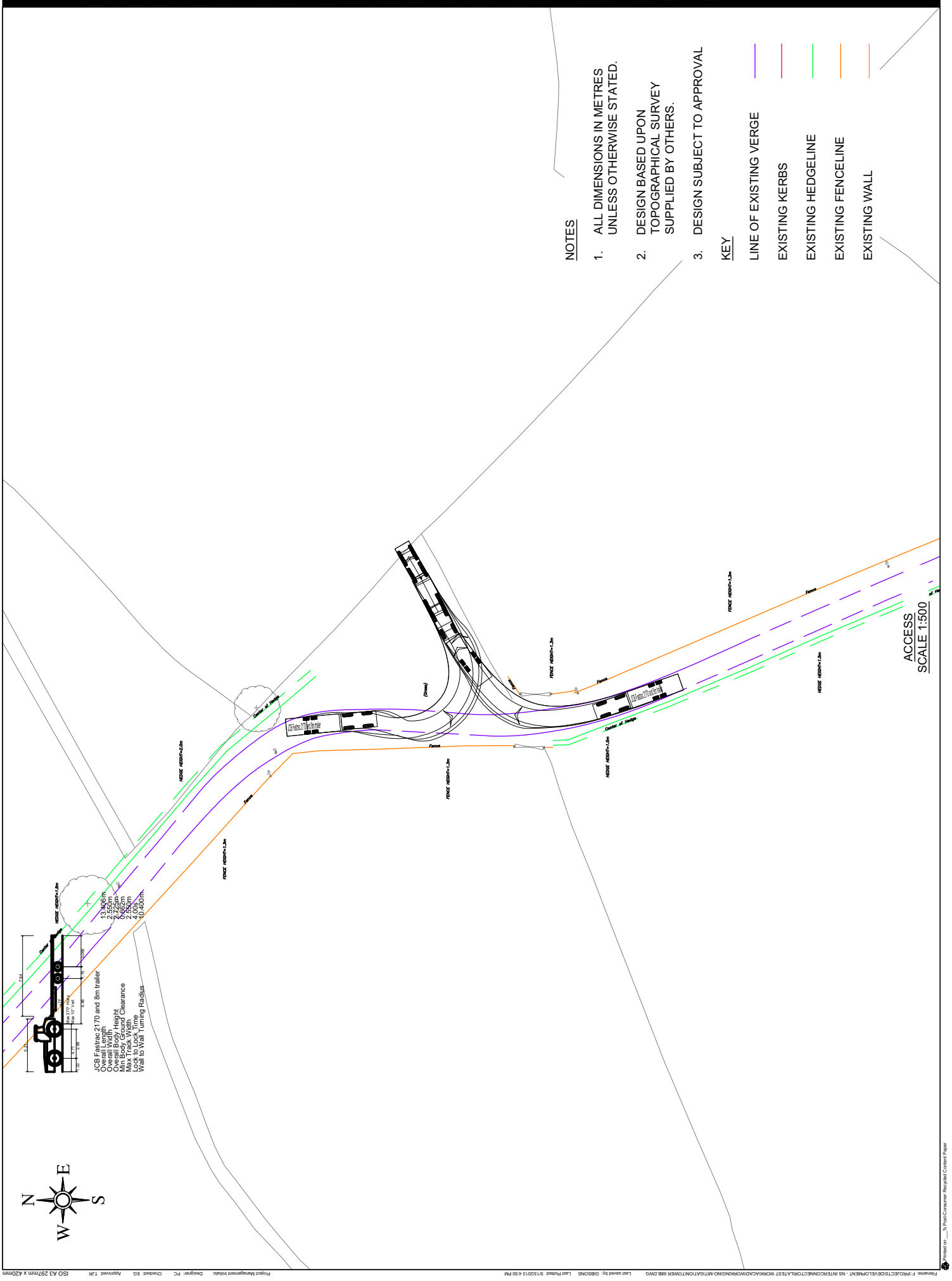
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL



JCB Fastrac 2170 and 8m trailer
 Overall Length 10.00m
 Overall Width 2.550m
 Overall Body Height 2.725m
 Overall Clearance 2.550m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m



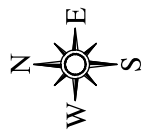
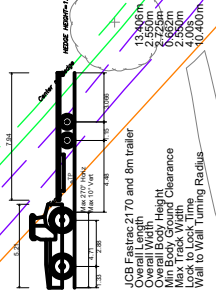


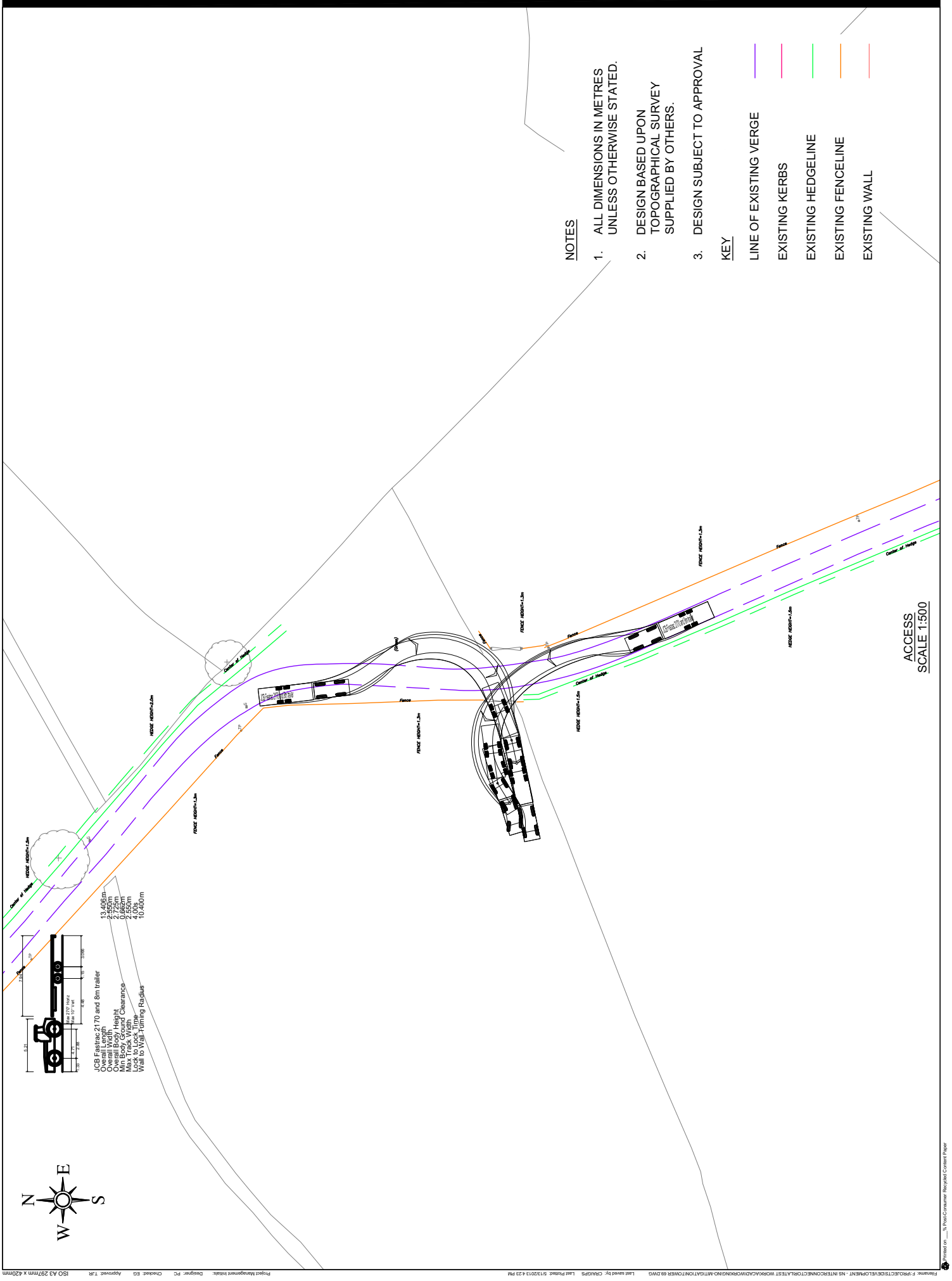
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL





NOTES

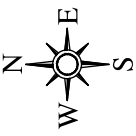
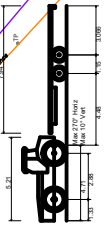
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

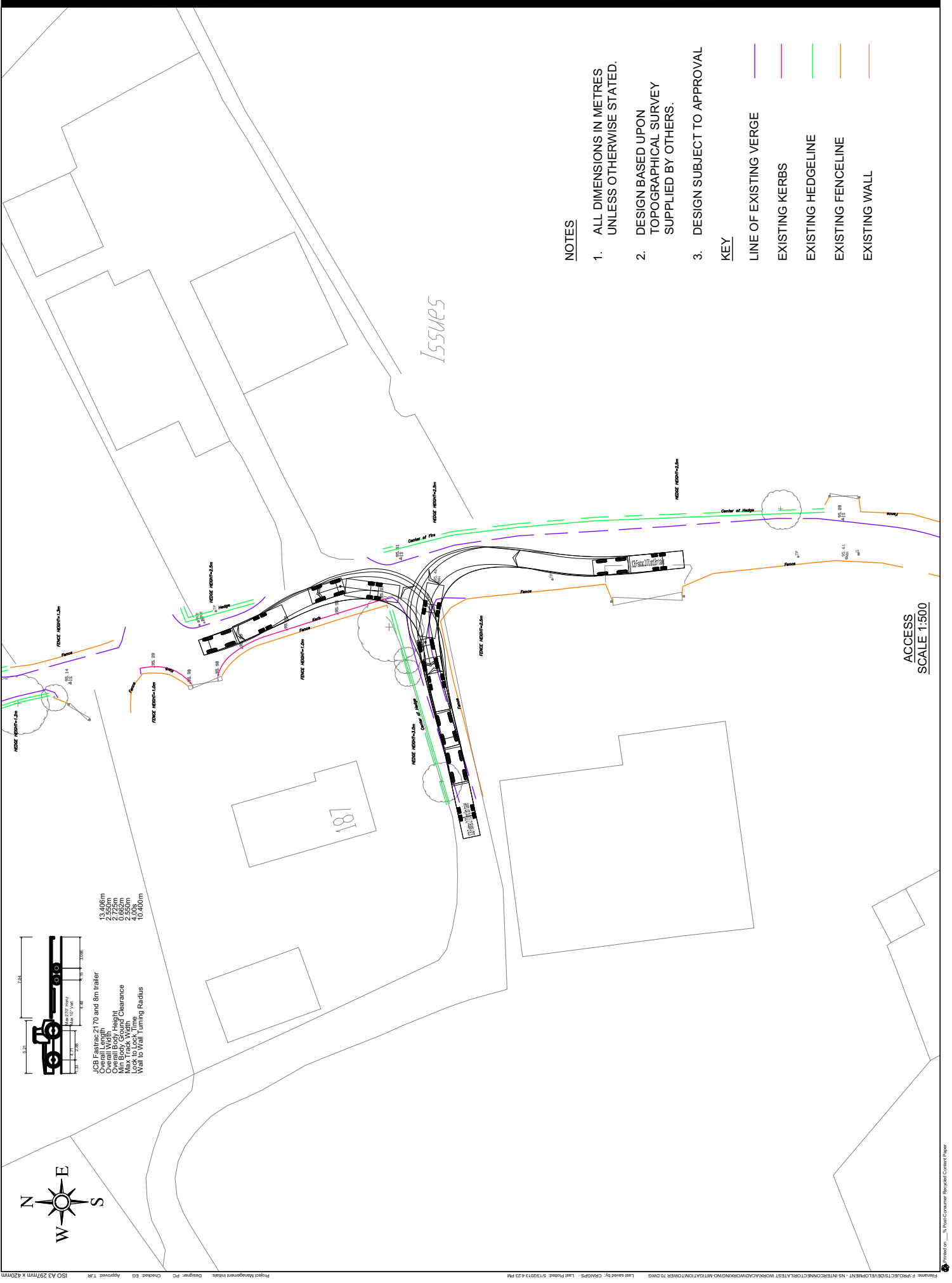
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500

JCB Fastrac 2170 and 8m trailer
 Overall Length 10.460m
 Overall Width 2.550m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wheel to Wheel Turning Radius 10.460m





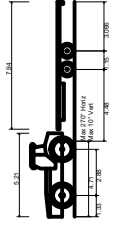
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

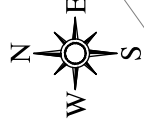
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Length 8.70m
 Overall Width 2.64m
 Overall Body Height 2.725m
 Overall Body Clearance 2.550m
 Max Track Width 4.00m
 Lock to Lock Time 10.400m
 Wheel to Wheel Turning Radius

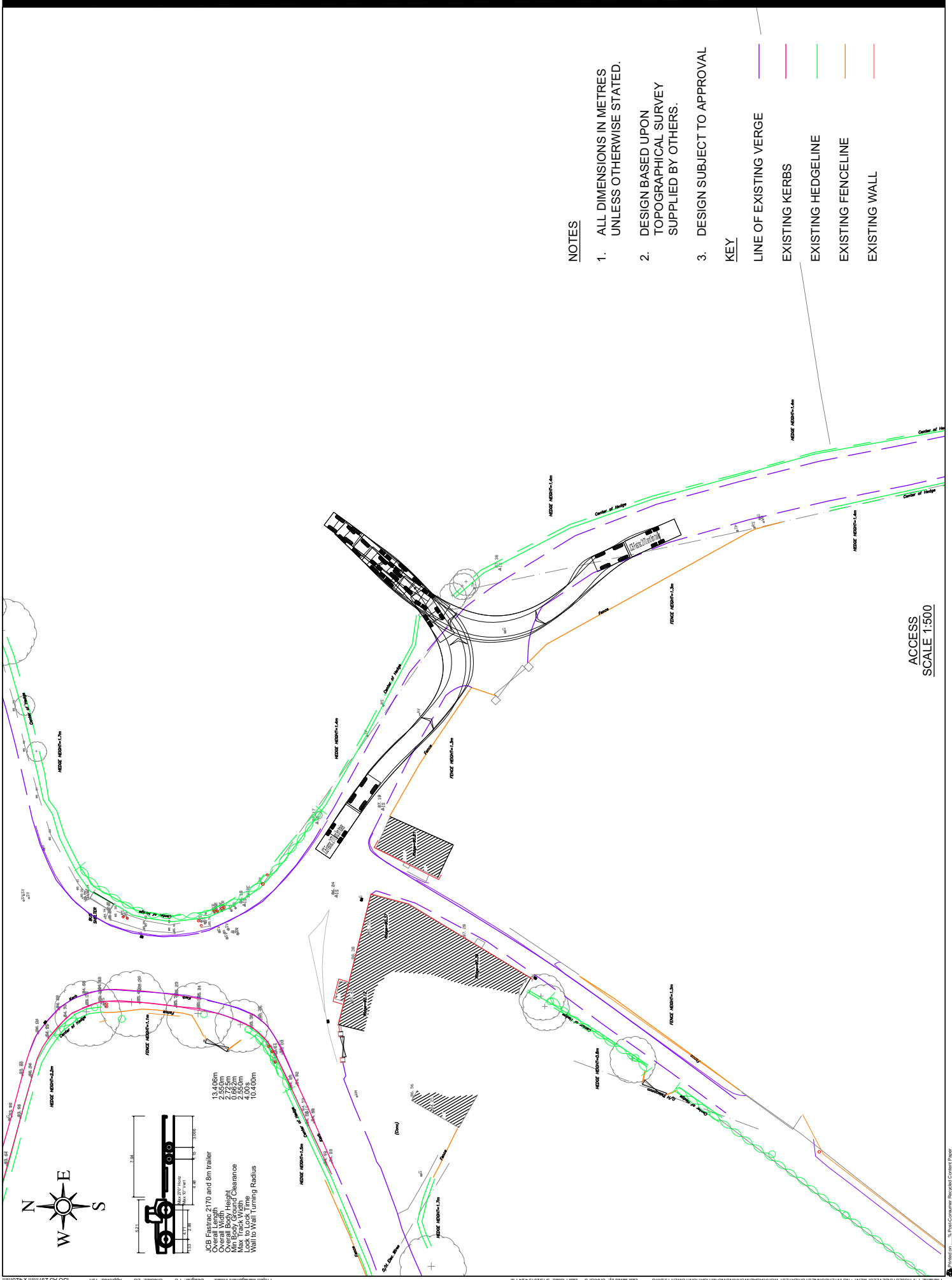


NOTES

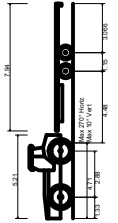
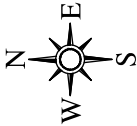
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

KEY

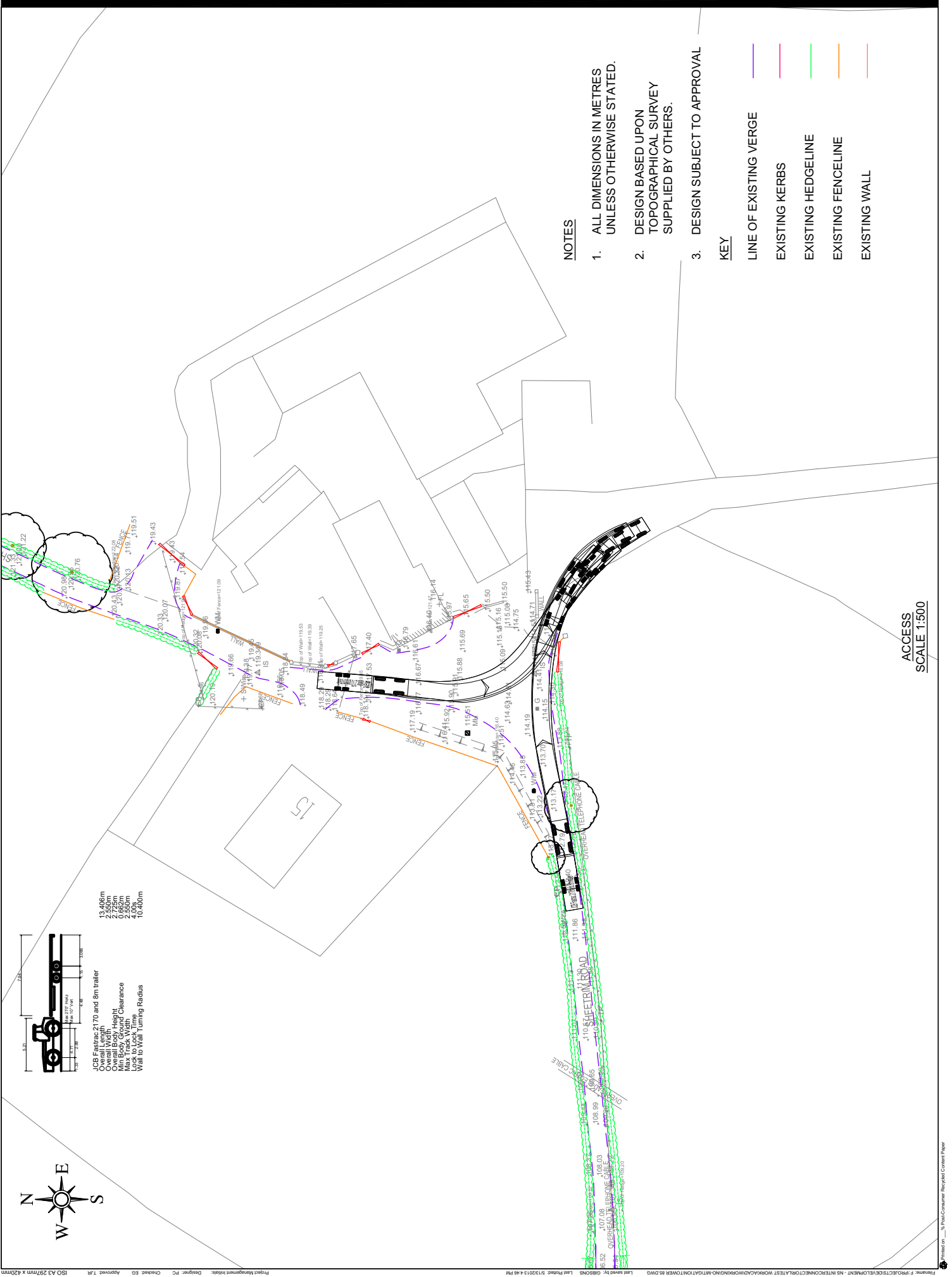
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL



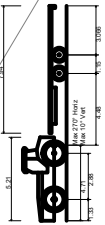
ACCESS SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Loss to Lock Time 4.00s
 Walk to Wall Turning Radius 10.400m



JCB Frastac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Body Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m



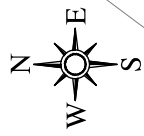
NOTES

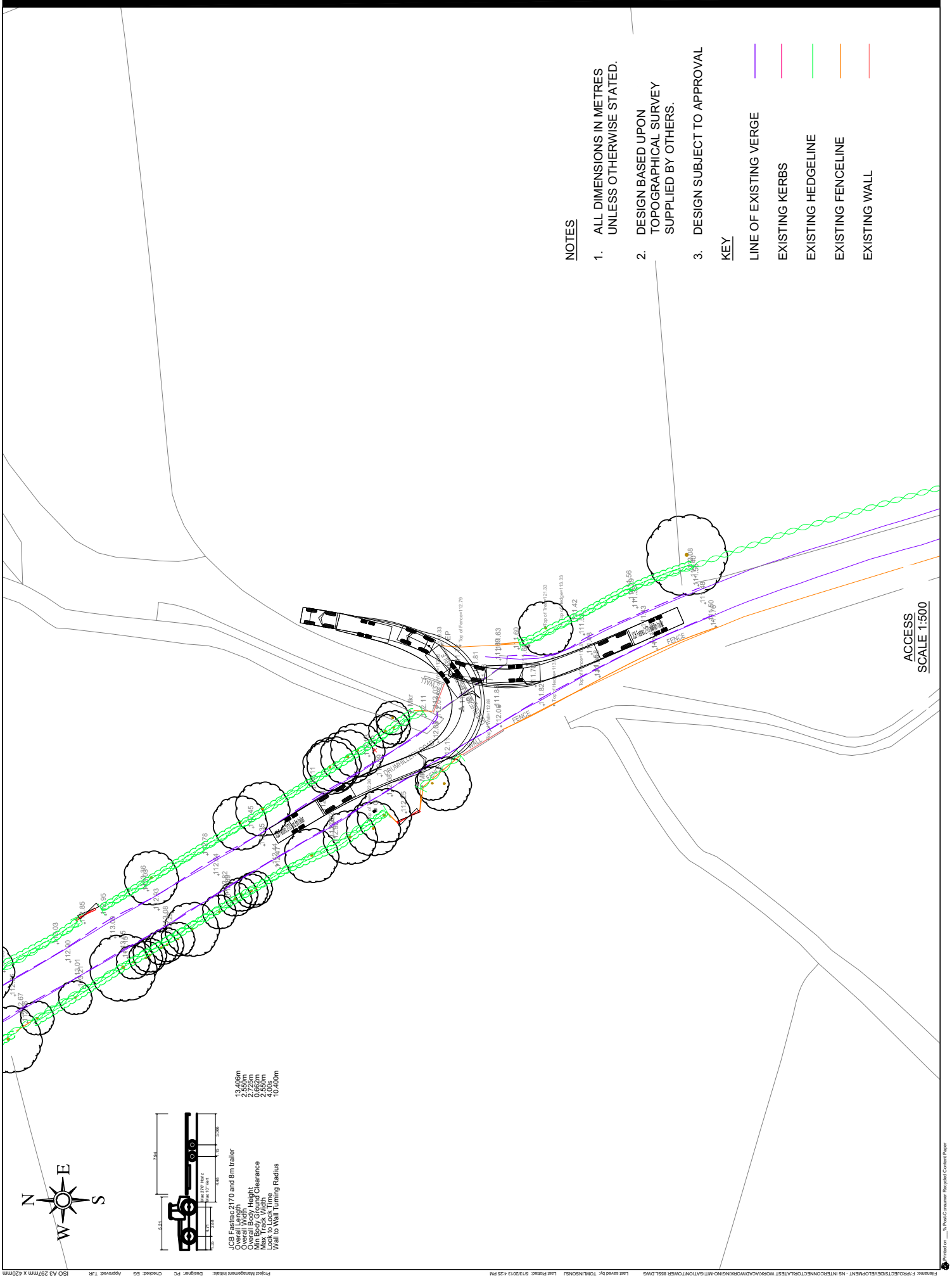
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500





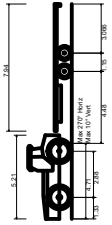
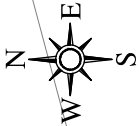
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

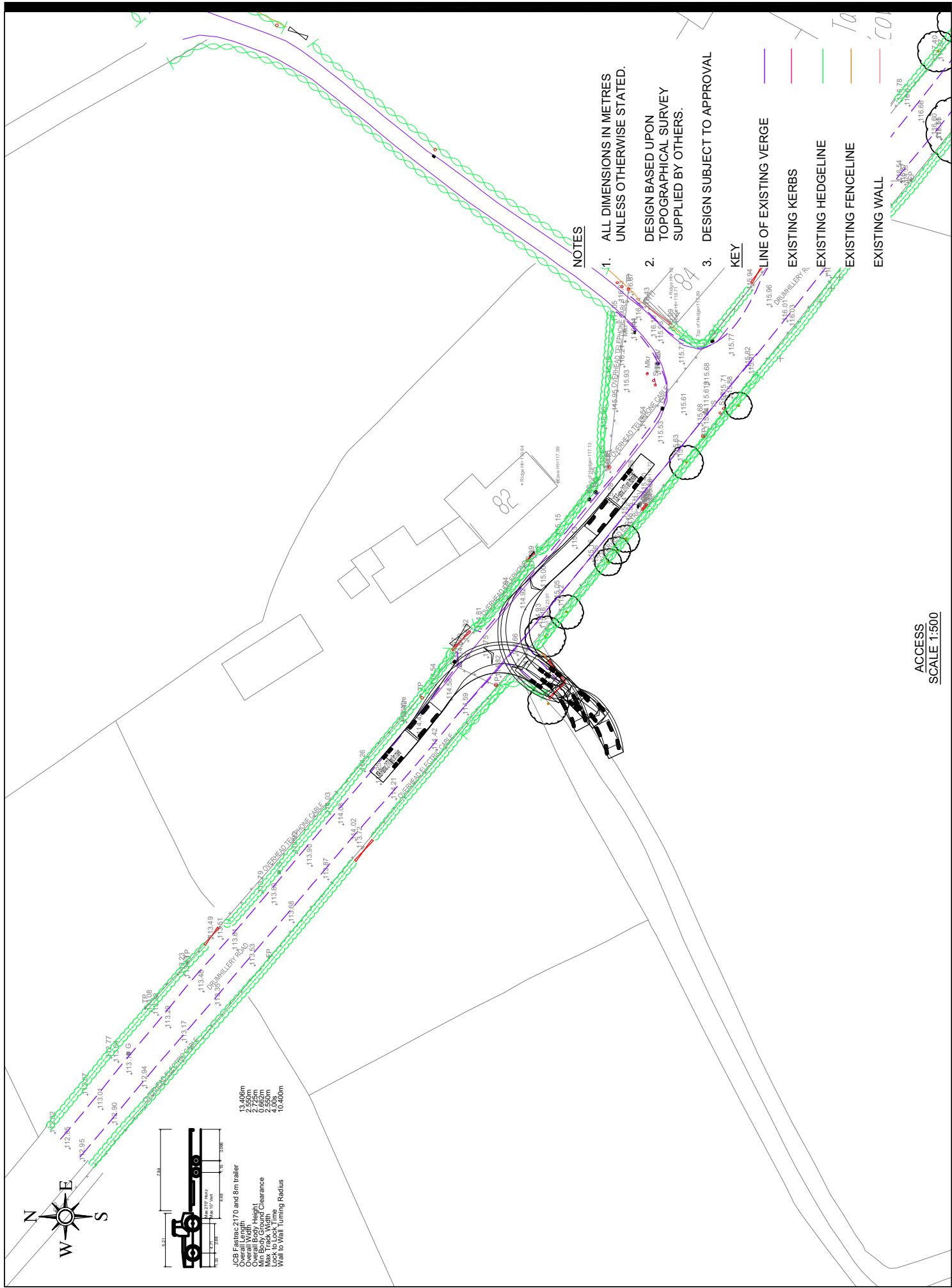
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500

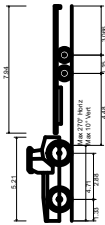


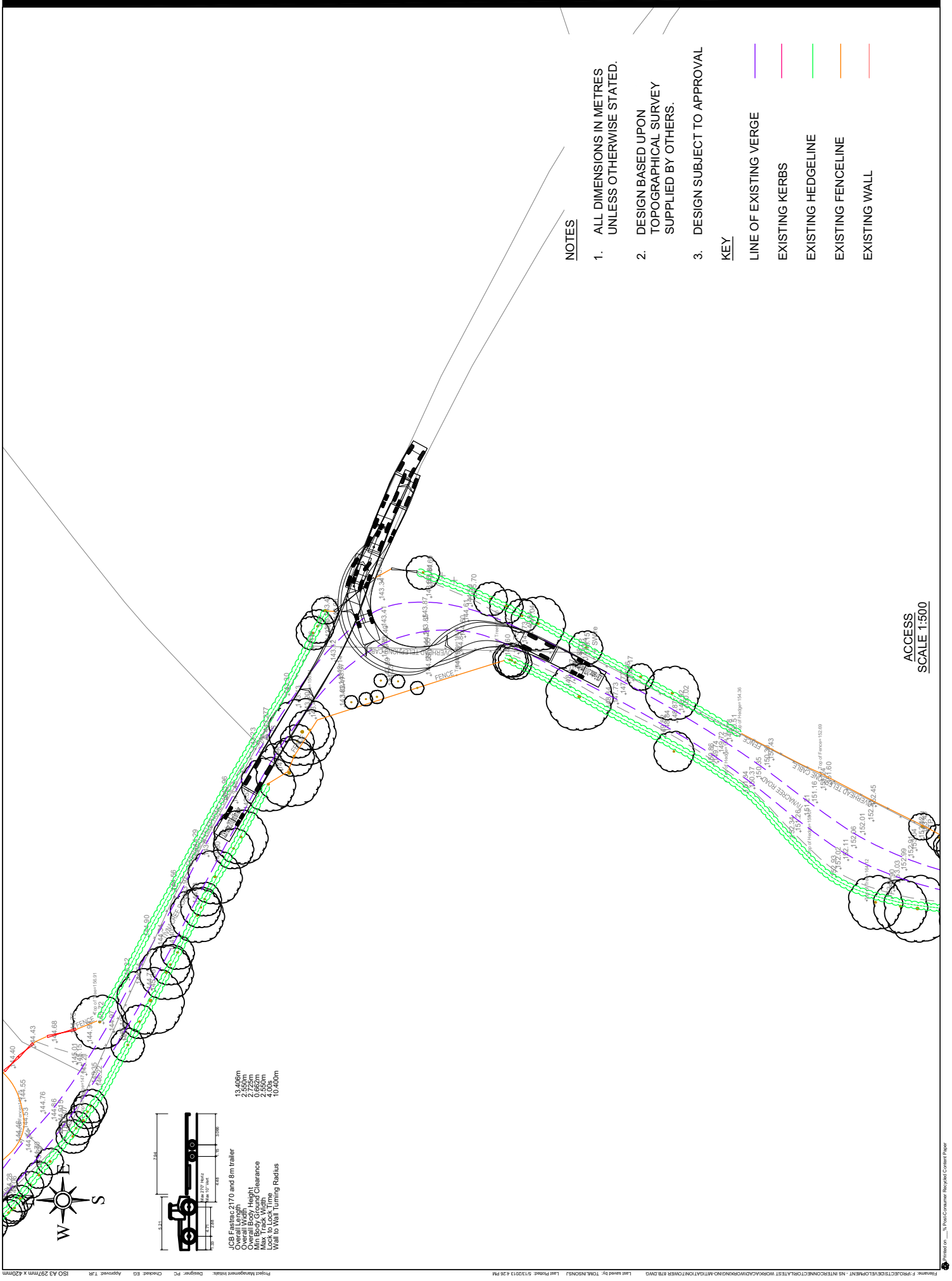
JCS Fence 2170 and 8m trailer
 Overall Length 13.466m
 Overall Width 2.726m
 Overall Body Height 0.665m
 Min Body Ground Clearance 0.400m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius



ACCESS SCALE 1:500

JCS Fence 2170 and 8m trailer
 Overall Length 13.406m
 Overall Width 2.725m
 Overall Body Height 0.665m
 Min Body Ground Clearance 4.009m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius 10.400m





NOTES

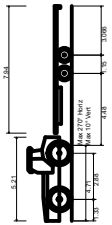
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

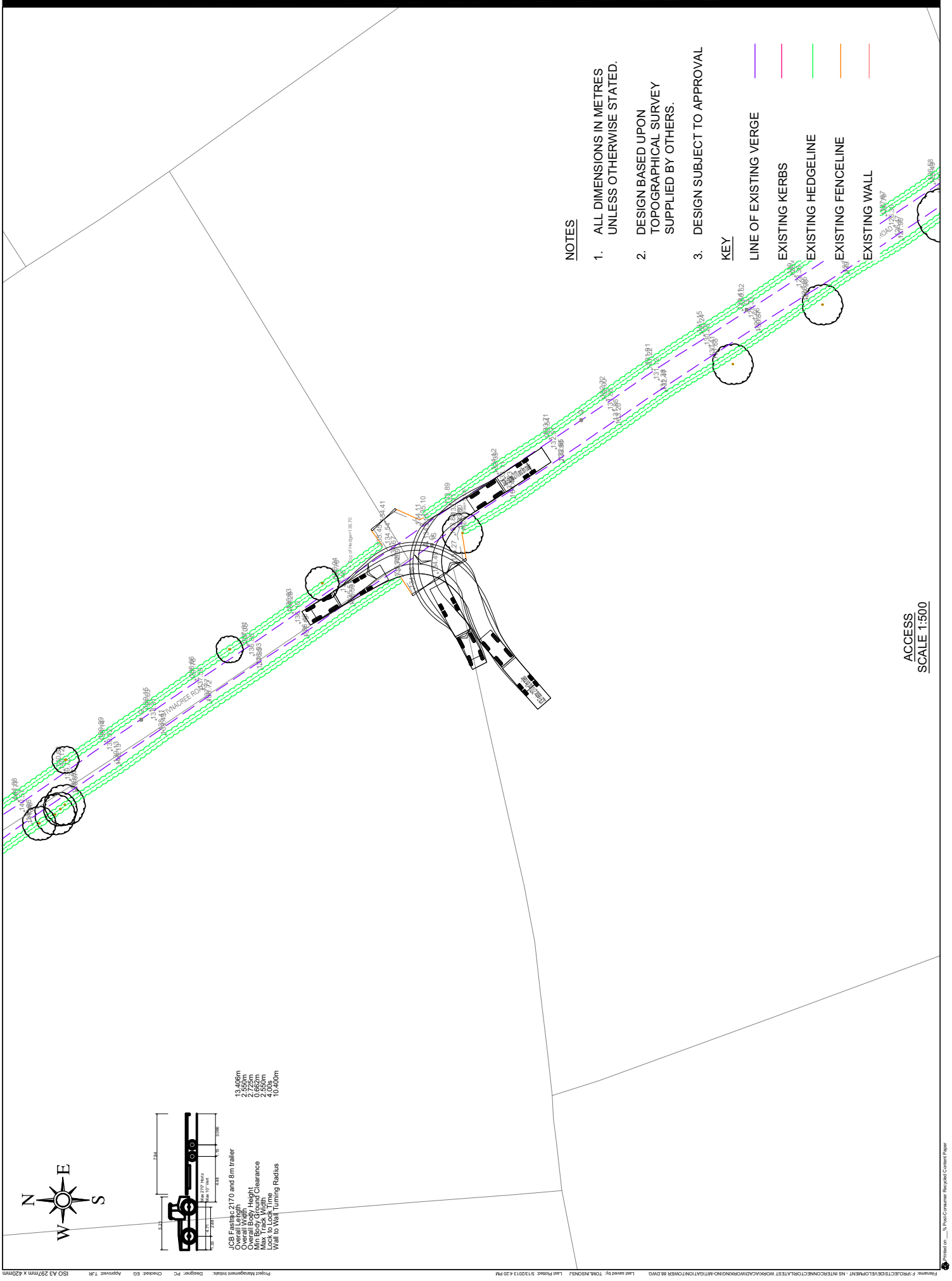
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500

JCB Fence 2170 and 8m trailer
 Overall Length 13.496m
 Overall Width 2.725m
 Overall Body Height 2.725m
 Min Body Ground Clearance 0.665m
 Max Body Ground Clearance 4.003m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius 10.400m





NOTES

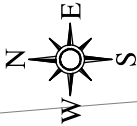
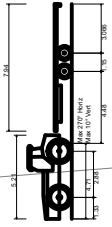
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

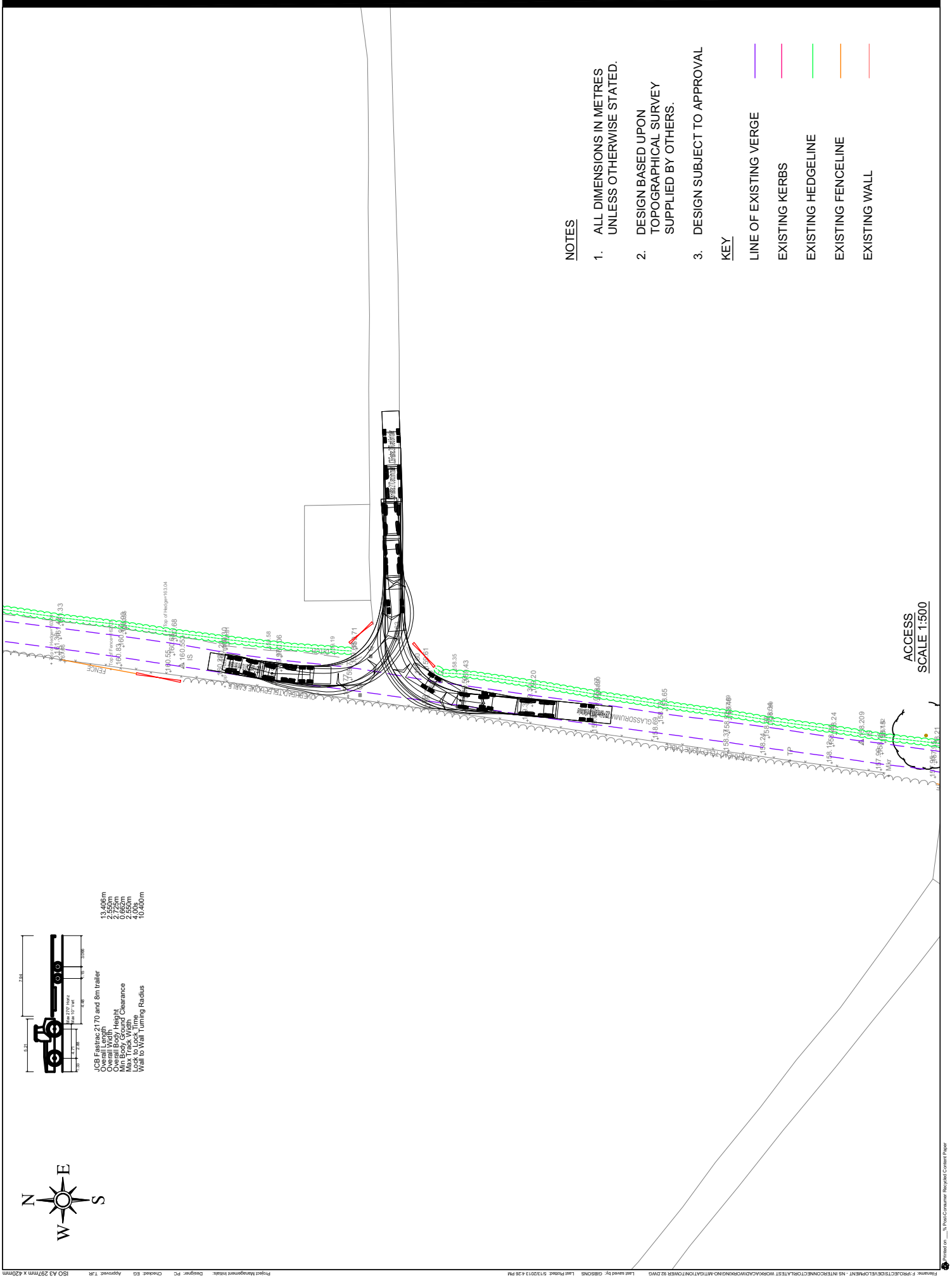
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500

JCS Ferret 2170 and 8m trailer
 Overall Length 13.466m
 Overall Width 2.726m
 Overall Body Height 0.665m
 Min Body Ground Clearance 4.00m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius





NOTES

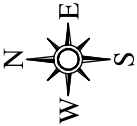
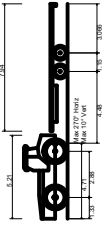
- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

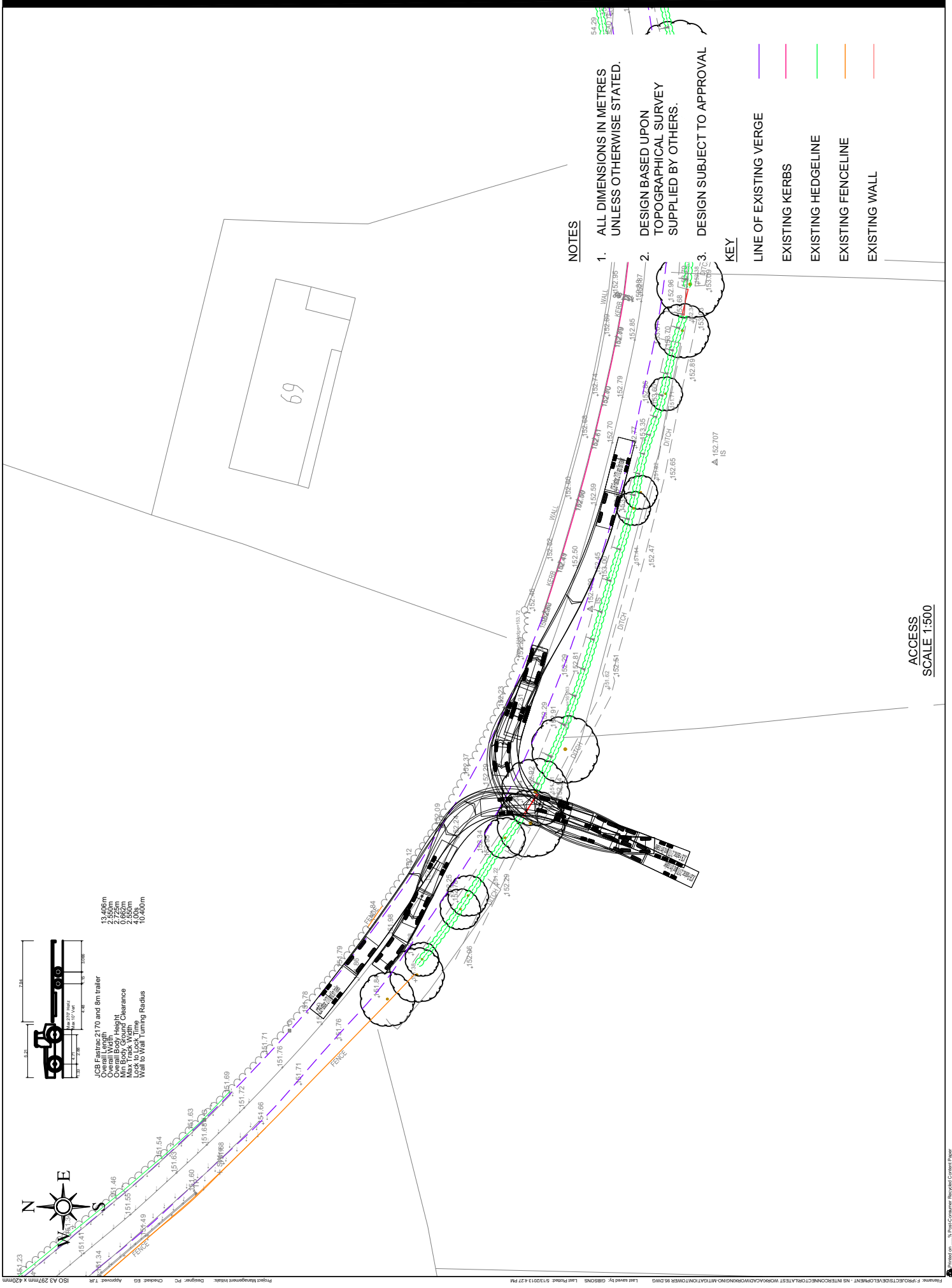
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

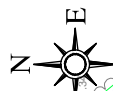
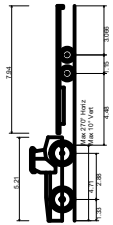
ACCESS SCALE 1:500

JCB Fratrac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Body Height 2.725m
 Overall Body Width 2.550m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m





JCB Fastrac 2170 and 8m trailer
 Overall Width 2.550m
 Overall Height 2.725m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m



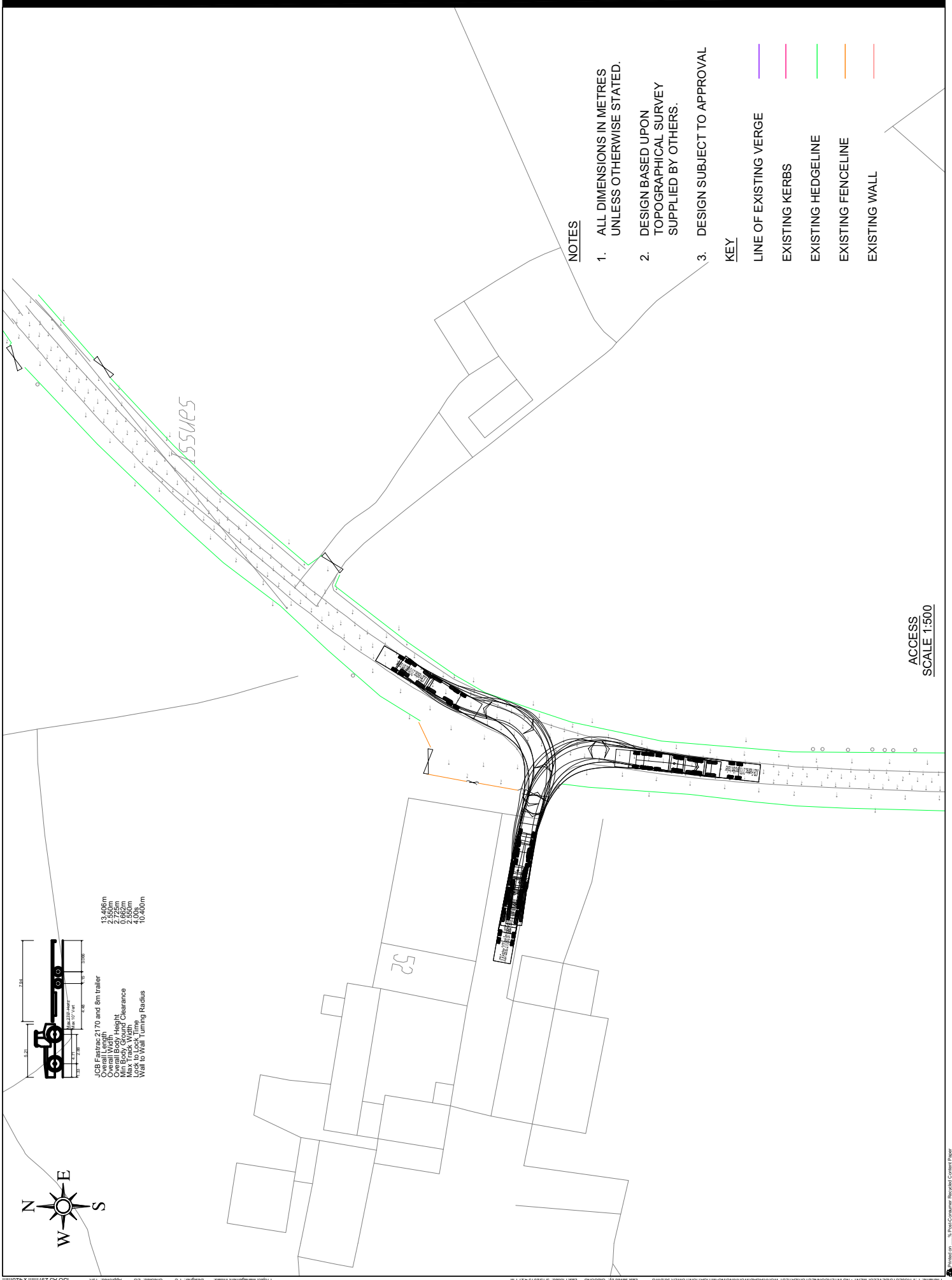
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

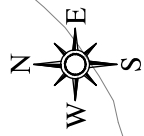
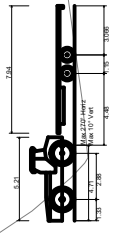
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Width 2.540m
 Overall Height 2.725m
 Max Track Width 2.550m
 Max Track Clearance 4.000m
 Lock to Lock Time 10.400m
 Wall to Wall Turning Radius



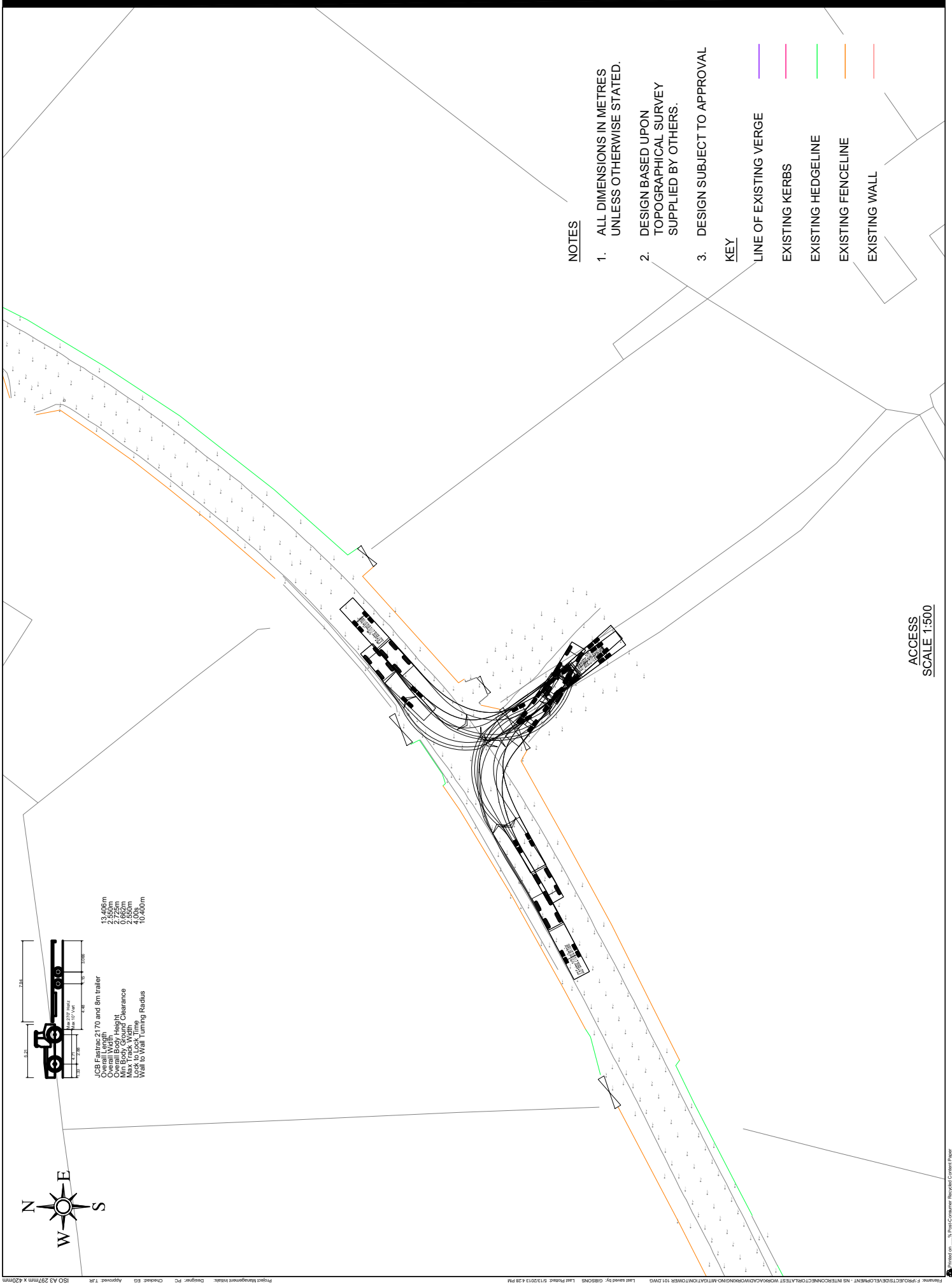
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS SCALE 1:500



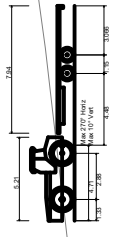
NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

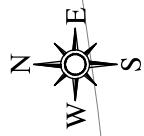
KEY

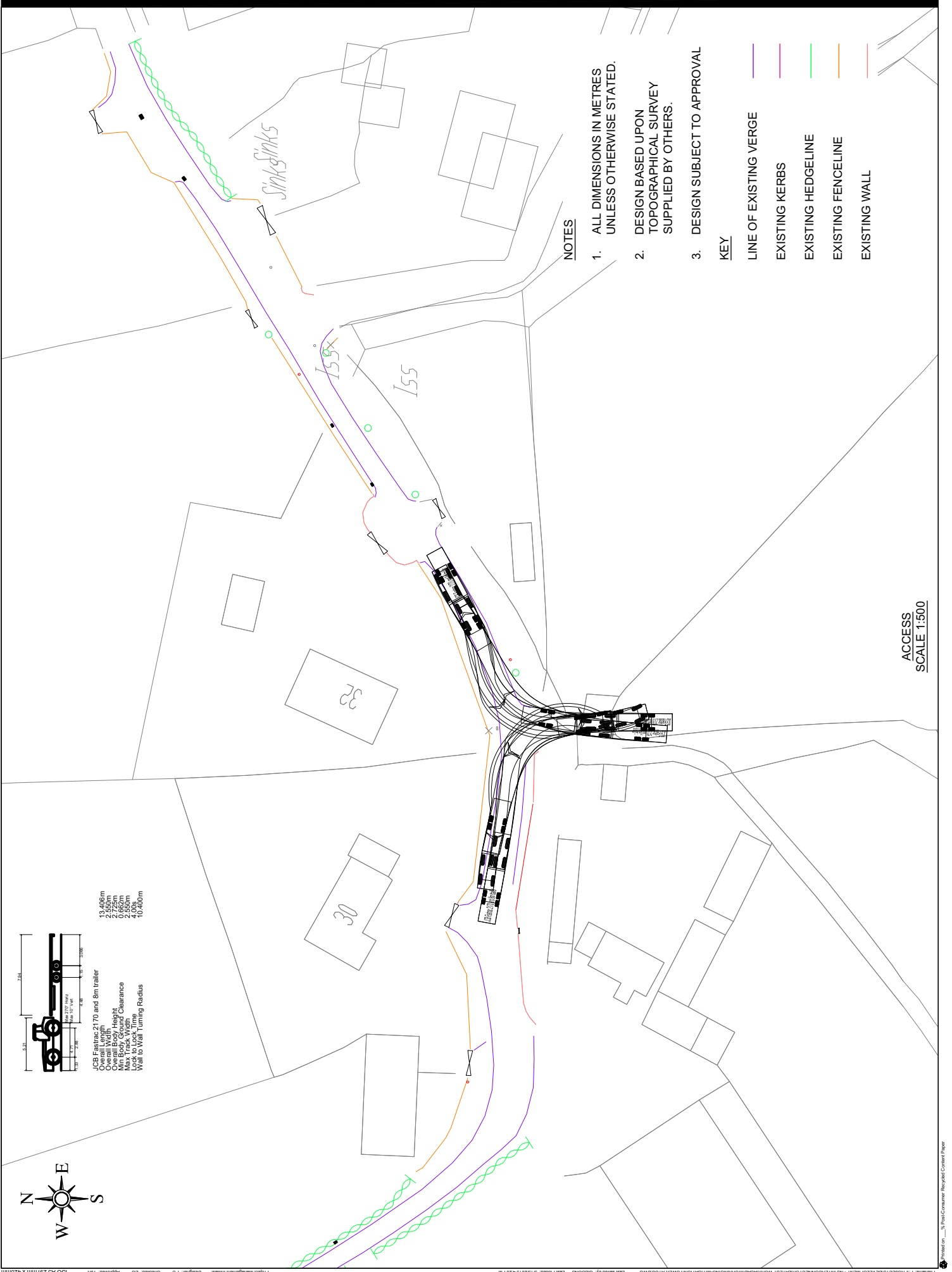
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL

ACCESS
SCALE 1:500



JCB Fastrac 2170 and 8m trailer
 Overall Height 2.54m
 Overall Width 2.72m
 Overall Body Height 2.72m
 Max Track Width 2.55m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m





JCB Frastrac 2170 and 8m trailer
 Overall Length 10.465m
 Overall Width 2.550m
 Overall Height 2.725m
 Max Track Width 2.550m
 Max Wheelbase 4.000m
 Max Turn Radius 10.400m

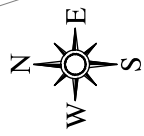
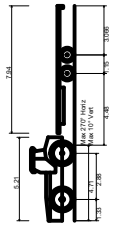
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

—	LINE OF EXISTING VERGE
—	EXISTING KERBS
—	EXISTING HEDGELINE
—	EXISTING FENCELINE
—	EXISTING WALL

ACCESS SCALE 1:500



Annex 10 – Proposed Mitigation/Enhancement Measures

TA Annex 10 - Proposed Mitigation Measures at Accesses

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT 1	1	T1	Trethewey Road	6.12	None Required	✗	✗	✗	✗
AT 2	1	T2	Derrygally Way	3.55	Verge adjacent to access can accommodate construction vehicles, removing it from live carriageway. Access is approximately 170m from nearest junction with A Class Road therefore conflicts with oncoming vehicles are nominal.	✗	✗	✗	✓
AT 3-4-5-6	4	T3, T4, T5 & T6	Trethewey Road	6.12	None Required	✗	✗	✗	✗
AT 7	1	T7	Major Lane	2.7	Access to be widened to facilitate construction vehicle movements. Major Lane is noted to have approximately four passing locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✓
AT 8-9	2	T8 & T9	Moy Road	9.9	None Required	✗	✗	✗	✗
AT 10	1	T10	Culkeeran Road	4.2	There is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT 11	1	T11	Culkeeran Road	4.2	None Required	✗	✗	✗	✗
AT 12	1	T12	Culkeeran Road	4.2	None Required	✗	✗	✗	✗
AT 13	1	T13	Rhone Road	2.98	Access to be widened to facilitate construction vehicles. Rhone Road is noted to have approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT 14	1	T14	Rhone Road	2.98	Construction vehicles will be required to reverse into the site and will therefore require onsite personnel to stop traffic to facilitate this manoeuvre. Road is noted to have approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✓
AT 15	1	T15	Gorestown Road	5.05	None Required	✗	✗	✗	✗
AT 16-17	2	T16, T17	Culrevog Road	2.85	No issues with access. The Culrevog Road has approximately nine passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT 18	1	T18	Culrevog Road	2.85	Access to be widened to facilitate construction vehicles. The Culrevog Road has approximately nine passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT 19	1	T19	Culrevog Road	2.85	Access to be widened to facilitate construction vehicles. The Culrevog Road has approximately nine passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT 20	1	T20	Benburb Road	5.39	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT 21	1	T21	Benburb Road	5.39	None Required	✗	✗	✗	✗
AT 22-23	2	T22 & T23	Benburb Road	5.39	None Required	✗	✗	✗	✗
AT 23SL	0	N/A	Drumlee Road	3.03	No issues with access. The Drumlee Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT 24-25	2	T24 & T25	Drumlee Road	3.03	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point. The Drumlee Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT26	1	T26	Benburb Road	5.39	There is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT 27-28	2	T27 & T28	Drumlee Road	3.03	No issues with access. The Drumlee Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT 29	1	T29	Clonfeacle Road	5.65	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT 30	1	T30	Tullydowey Road	3.15	Access to be widening to facilitate construction vehicles. The Tullydowey Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✓
AT 31-32A	2	T31 & T32	Tullydowey Road	3.15	No issues at access. The Tullydowey Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✓

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT 32B	1	T32	Tullydowey Road	3.15	Located at 'end of lane' therefore no issues at access. The Tullydowey Road has approximately six passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✓
AT 33	1	t33	Artasooly Road	4.69	There is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT 33SL	0	N/A	Artasooly Road	4.69	None Required	✗	✗	✗	✗
AT 34	1	T34	Artasooly Road	4.69	Access to be widened to facilitate construction vehicles.	✗	✗	✓	✗
AT 35	1	T35	Artasooly Road	4.69	Access is too narrow to accommodate construction vehicles. However, there is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT 36	1	T36	Artasooly Road	4.69	None Required	✗	✗	✗	✗
AT 37SL-38-39	3	T37, T38 & T39	Artasooly Road	4.69	None Required	✗	✗	✗	✗
AT 40	1	T40	Artasooly Road	4.94	None Required	✗	✗	✗	✗
AT41A	1	T41	Tullysaran Road	4.94	Access to be widened to accommodate construction vehicles.	✗	✗	✓	✗
AT 41B-42	2	T41 & T42	Tullysaran Road	4.94	Access to be widened to accommodate construction vehicles.	✗	✗	✓	✗
AT 43	1	T43	Tullyneagh Road	4.4	Access movements limited to left in and right out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT 44	1	T44	Battleford Road	6.61	None Required	✗	✗	✗	✗
AT45	1	T45	Battleford Road	6.61	Access is too narrow to accommodate construction vehicles. However, there is sufficient road width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT46	1	T46	Battleford Road	6.61	None Required	✗	✗	✗	✗
AT47	1	T47	Bracknagh Road	3.75	Access is too narrow to accommodate construction vehicles. However, there is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system. The Bracknagh Road has approximately nine passing opportunity locations and areas where the road widens, allowing construction vehicles to navigate to the site without issue.	✓	✗	✗	✗
AT48A	1	T48	Bracknagh Road	3.75	Access movements limited to left in and right out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point. The Bracknagh Road has approximately nine passing opportunity locations and areas where the road widens, allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT48B	1	T48	Bracknagh Road	3.75	No issues at access. The Bracknagh Road has approximately nine passing opportunity locations and areas where the road widens, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT49/49SL	1	T49	Bracknagh Road	3.75	Access movements limited to left in and right out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point. The Bracknagh Road has approximately nine passing opportunity locations and areas where the road widens, allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT50	1	T50	Bracknagh Road	3.75	Access to be widened to accommodate construction vehicles. The Bracknagh Road has approximately nine passing opportunity locations and areas where the road widens, allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT51	1	T51	Navan Fort Road	2.98	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point. The route to the access will be via the Bracknagh Road and a 1km section of the Navan Fort Road, passing opportunities are available on both roads allowing construction vehicles to navigate to site without issue.	✗	✓	✗	✗
AT52	1	T52	Navan Fort Road	2.98	Access to be widened to accommodate construction vehicles. The route to the access will be via the Bracknagh Road and a 1km section of the Navan Fort Road, passing opportunities are available on both roads allowing construction vehicles to navigate to site without issue.	✗	✗	✓	✗
AT52SL	0	N/A	Navan Fort Road	2.98	Access to be widened to accommodate stringing location vehicles. The route to the access will be via the Bracknagh Road and a 1km section of the Navan Fort Road, passing opportunities are available on both roads allowing stringing location vehicles to navigate to site without issue.	✗	✗	✓	✗

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT53	1	T53	Killylea Road	7.15	<i>None Required</i>	✗	✗	✗	✗
AT54	1	T54	Killylea Road	7.15	Access movements limited to right in. All construction vehicles will be advised of restricted manoeuvre into the access and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT55	1	T55	Cormeen Road	5.33	<i>None Required</i>	✗	✗	✗	✗
AT56	1	T56	Cormeen Road	5.33	<i>None Required</i>	✗	✗	✗	✗
AT57-58	1	T57 + T58	Unclassified Road	3.68	No issues at access. The road to the access has approximately six passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT58SL	0	N/A	Unclassified Road	3.68	No issues at access. The road to the access has approximately six passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT59-60	2	T59 + T60	Unclassified Road	3.68	Located at 'end of lane' therefore no issues at access. The road to the access has approximately six passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT61	1	T61	Ballyhoy Road	2.7	Located at 'end of lane' therefore no issues at access. The road to the access has approximately five passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT62SL	1	T62	Unclassified Road	3.00	Access movements can be accommodated by access and unclassified road serves as an access for 3 properties therefore it is considered that no mitigation measures are required.	✗	✗	✗	✗
AT62-63	2	T62 + T63	Monaghan Road spur	3.38	Located at 'end of lane' therefore no issues at access. The road to the access has approximately six passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT64	1	T64	Monaghan Road spur	3.38	Located at 'end of lane' therefore no issues at access. The road to the access has approximately five passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT65	1	T65	Brootally Road	3.9	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT66	1	T66	Brootally Road	3.9	<i>None Required</i>	✗	✗	✗	✗
AT67	1	T67	Brootally Road	3.9	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT68A	1	T68	Dernalea Road	3.71	No issues at access. The road to the access has approximately seven passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT68B	1	T68	Dernalea Road	3.71	No issues at access. The road to the access has approximately seven passing opportunity locations, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT69	1	T69	Dernalea Road	3.71	No issues at access. The road to the access has approximately four passing opportunity locations from the Monaghan Rd direction, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT70	1	T70	Dernalea Road	3.71	No issues at access. The road to the access has approximately four passing opportunity locations from the Monaghan Rd direction, allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT71-71SL1	1	T71	Dernalea Road	3.15	Located at 'end of lane' therefore no issues at access. Approach road from Monaghan Road is private access road therefore passing opportunities not required.	✗	✗	✗	✗
AT71SL2	0	N/A	Dernalea Road	3.71	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point. The road to the access has approximately two passing opportunity locations from the Monaghan Rd direction, allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT72	1	T72	Dernalea Road	3.71	Existing access can accommodate construction vehicles; however the access is restricted to right in and left out. The road to the access has no passing opportunities from the Monaghan Road, however the access is located <1km from the Monaghan Road allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT73	1	T73	Maddan Road	3.71	No issues at access. Approach road from Monaghan Road is private access road therefore passing opportunities not required.	✗	✗	✗	✗

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT74	1	T74	Unclassified Road	2.73	Access to be widened to accommodate construction vehicles. The road to the access has no passing opportunities and cannot facilitate a one way system. Therefore new passing opportunities will be required during the construction period with location to be agreed with land owners.	✗	✗	✓	✓
AT74SL1A	0	N/A	Maddan Road	5.88	New access required as no existing access for stringing location.	✗	✗	✓	✗
AT74SL1B	0	N/A	Maddan Road	2.73	The road to the access has no passing opportunities and cannot facilitate a one way system. Therefore new passing opportunities will be required during the construction period with location to be agreed with land owners.	✗	✗	✗	✓
AT74SL2	0	N/A	Maddan Road	5.88	Access movements limited to right in and left out. All construction vehicles will be advised of restricted manoeuvres and adequate signage will be provided at the access point.	✗	✓	✗	✗
AT75	1	T75	Unclassified Road	2.73	Access movements limited to right in and left out. The road to the access has no passing opportunities and cannot facilitate a one way system. Therefore new passing opportunities will be required during the construction period with location to be agreed with land owners.	✗	✓	✗	✓
AT76	1	T76	Hanslough Road	4.95	Access is too narrow to accommodate construction vehicles, however there is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT77-78A	2	T77 + T78	Cavanagarvan Road	2.72	Access to be widened to accommodate construction vehicles. The Cavanagarvan Road has approximately ten passing opportunities between Maddan Rd and Drumhillery Rd allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT77-78B	2	T78 + T79	Cavanagarvan Road	2.72	Access to be widened to accommodate construction vehicles. The Cavanagarvan Road has approximately ten passing opportunities between Maddan Rd and Drumhillery Rd allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT79	1	T79	Cavanagarvan Road	2.72	Access to be widened to accommodate construction vehicles. The Cavanagarvan Road has approximately ten passing opportunities between Maddan Rd and Drumhillery Rd allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT80	1	T80	Sheetrim Road	2.73	Access movements limited to right in and left out. The proposed access is located approximately 200m from the junction with the Cavanagarvan Road and therefore allows construction vehicles to navigate to the site without issue. Furthermore the Cavanagarvan Road is noted to have has approximately ten passing opportunities.	✗	✓	✗	✗
AT81	1	T81	Sheetrim Road	2.73	Access to be widened to accommodate construction vehicles. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT82	1	T82	Sheetrim Road	2.73	Access to be widened to accommodate construction vehicles. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT83A	1	T83	Sheetrim Road	2.73	Access to be widened to accommodate construction vehicles. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT83B	1	T83	Sheetrim Road	2.73	Access to be widened to accommodate construction vehicles. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT84	1	T84	Sheetrim Road	2.73	Access to be widened to accommodate construction vehicles. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT85	1	T85	Sheetrim Road	2.73	No issues at access. The Sheetrim Road has approximately eight passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT85SSL	0	N/A	Drumhillery Road	4.63	<i>None Required</i>	✗	✗	✗	✗
AT86	1	T86	Drumhillery Road	4.63	Access is too narrow to accommodate construction vehicles, however there is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT87A	1	T87	Drumhillery Road	4.63	<i>None Required</i>	✗	✗	✗	✗

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT87B	1	T87	Tivnacree Road	2.76	No issues at access. However a section of the Tivnacree Road to the south of the access is too narrow for construction vehicles to pass through, therefore the access is to be limited to left in and right out. There are four passing opportunities to the north between the access point and Drumhillery Road allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT88	1	T88	Tivnacree Road	2.76	No issues at access. However a section of the Tivnacree Road to the south of the access is too narrow for construction vehicles to pass through, therefore the access is to be limited to left in and right out. There are four passing opportunities to the north between the access point and Drumhillery Road allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT89	1	T89	Tivnacree Road	2.76	No issues at access, however construction vehicles will be limited to turning right out. The Tivnacree Road has approximately five passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT90	1	T90	Tivnacree Road	2.76	No issues at access, however construction vehicles will be limited to left in and right out. The Tivnacree Road has approximately five passing opportunity locations allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT91	1	T91	Glassdrummond Road	3.18	Access to be widened to facilitate construction vehicles. The Glassdrummond Road has approximately four passing opportunities on the approach from the Fergot Road allowing construction vehicles to navigate to the site without issue.	✗	✗	✓	✗
AT92	1	T92	Glassdrummond Road	3.18	No issues at access. The Glassdrummond Road has approximately four passing opportunities on the approach from the Fergot Road allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT93-94	2	T93 + T94	Unclassified Road	3.18	Access is limited to left in and right out. The access road on approach from the Fergot Road has three passing opportunities allowing construction vehicles to navigate to the site without issue.	✗	✓	✗	✗
AT95	1	T95	Fergot Road	5.5	<i>None Required</i>	✗	✗	✗	✗
AT96	1	T96	Unclassified Road	3	No issues at access. The access road on approach from the Fergot Road has four passing opportunities allowing construction vehicles to navigate to the site without issue.	✗	✗	✗	✗
AT97	1	T97	Listarkelt Road	2.5	Access geometry limited and no passing opportunities exist on the section of Listarkelt Road between the Derrynoose Road and Doohat Road. No dwellings are located on this section of road therefore it will be designated one way entering from the Derrynoose Road and exiting onto the Doohat Road. Construction vehicles will be required to reverse into the access point and then exit right out only.	✗	✓	✗	✓
AT98	1	T98	Listarkelt Road	2.5	Access geometry limited and no passing opportunities exist on the section of Listarkelt Road between the Derrynoose Road and Doohat Road. No dwellings are located on this section of road therefore it will be designated one way entering from the Derrynoose Road and exiting onto the Doohat Road. Construction vehicles will be required to reverse into the access point and then exit left out only.	✗	✓	✗	✓
AT99	1	T99	Doohat Road	4.15	Access too narrow to accommodate construction vehicles, however there is sufficient verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT100	1	T100	Derrynoose Road	5.98	Access too narrow to accommodate construction vehicles, however there is sufficient road/ verge width at the site access to allow for a construction vehicle to park and be traffic managed via a one way shuttle system.	✓	✗	✗	✗
AT101	1	T101	Derrynoose Road	5.98	<i>None Required</i>	✗	✗	✗	✗
AT102A	1	T102	Unclassified Road	2.83	Access to be widened to accommodate construction traffic. The road to the access contains no passing opportunities and represents a hazard to other road users. Therefore it is proposed to implement a one way system on the access road entering from the Doohat Road and exiting onto the Legmare Road, which links onto the L3530/ Derrynoose Road. There are six properties that access onto the road which will require notification of the temporary one system operation during construction works.	✗	✓	✓	✓

Access Reference	Total Towers Accessed	Tower Numbers	Adjoining Road	Average Road Width (m)	Enhancement Mitigations Required	TM Shuttle Running at Access	TM Restricted Movements at Access	Access Widening Required	TM Required En Route
AT102B	1	T102	Unclassified Road	2.83	Access to be widened to accommodate construction traffic. The road to the access contains no passing opportunities and represents a hazard to other road users. Therefore it is proposed to implement a one way system on the access road entering from the Doohat Road and exiting onto the Legmare Road, which links onto the L3530/ Derrynoose Road. There are six properties that access onto the road which will require notification of the temporary one system operation during construction works.	✘	✓	✓	✓
ATOS	0	N/A	Crossbane Road	3.65	No issues with access. The Crossbane Road contains five passing opportunities allow stringing vehicles to navigate to the site without issue.	✘	✘	✘	✘

TYRONE - CAVAN INTERCONNECTOR

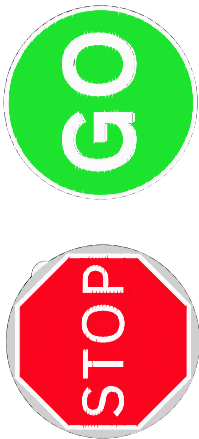
TRAFFIC MANAGEMENT - TYPICAL SHUTTLE RUN

AT ACCESS POINT

600322220



Project Management: Designer: PC Checked: EG Approved: TR
Last Drawn By: CCA/CPB Last Printed: 9/14/2013 10:31 AM
Shuttle DWS
Frame: P:\PROJECTS\DEVELOPMENT - NS INTERCONNECTOR\ALIST WORK\CAVAN\DRAWINGS\TRAFFIC MANAGEMENT\TRAFFIC MANAGEMENT - SHUTTLE RUN.dwg
Plot File: P:\PROJECTS\DEVELOPMENT - NS INTERCONNECTOR\ALIST WORK\CAVAN\DRAWINGS\TRAFFIC MANAGEMENT\TRAFFIC MANAGEMENT - SHUTTLE RUN.dwg
Plot File: P:\PROJECTS\DEVELOPMENT - NS INTERCONNECTOR\ALIST WORK\CAVAN\DRAWINGS\TRAFFIC MANAGEMENT\TRAFFIC MANAGEMENT - SHUTTLE RUN.dwg



SIGN NO. 7024
TSR NI 1997

SIGN NO. 7023
TSR NI 1997

CARRIAGEWAY

VERGE

VERGE

GATE

2.50m

JOB Features 270 and 280
JOB Features 270 and 280



NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —

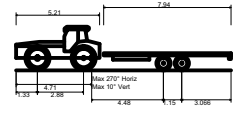
2.0m x 33m
VISIBILITY SPLAYS

MAJOR LANE

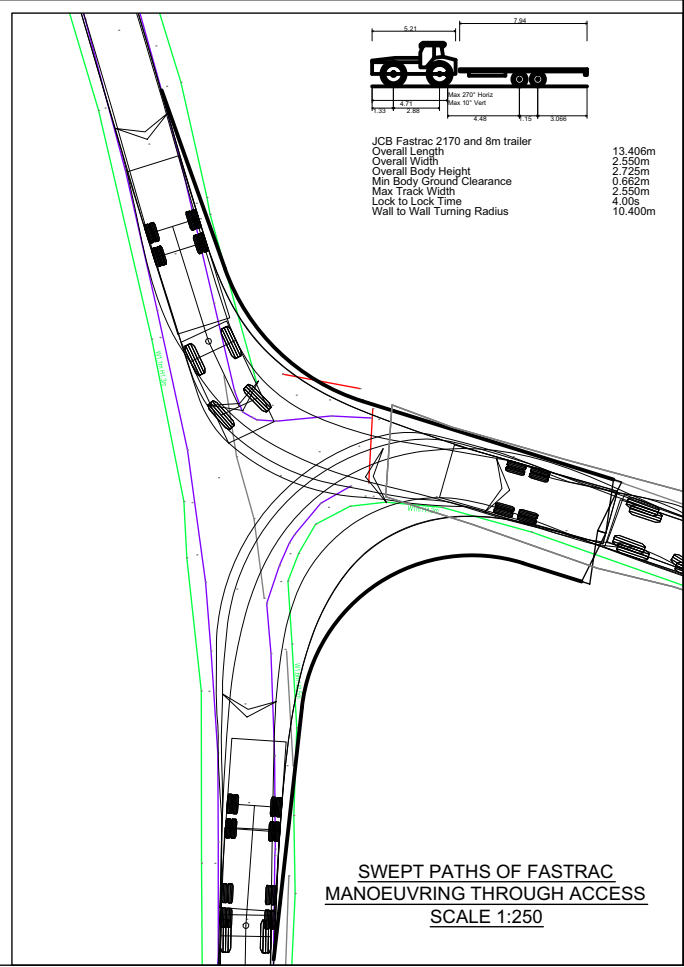
R10

18

R8

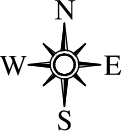


JCB Fastrac 2170 and 8m trailer
 Overall Length 13.406m
 Overall Width 2.550m
 Overall Body Height 2.725m
 Min Body Ground Clearance 0.862m
 Max Track Width 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m



SWEPT PATHS OF FASTRAC
 MANOEUVRING THROUGH ACCESS
 SCALE 1:250

ACCESS
 SCALE 1:500

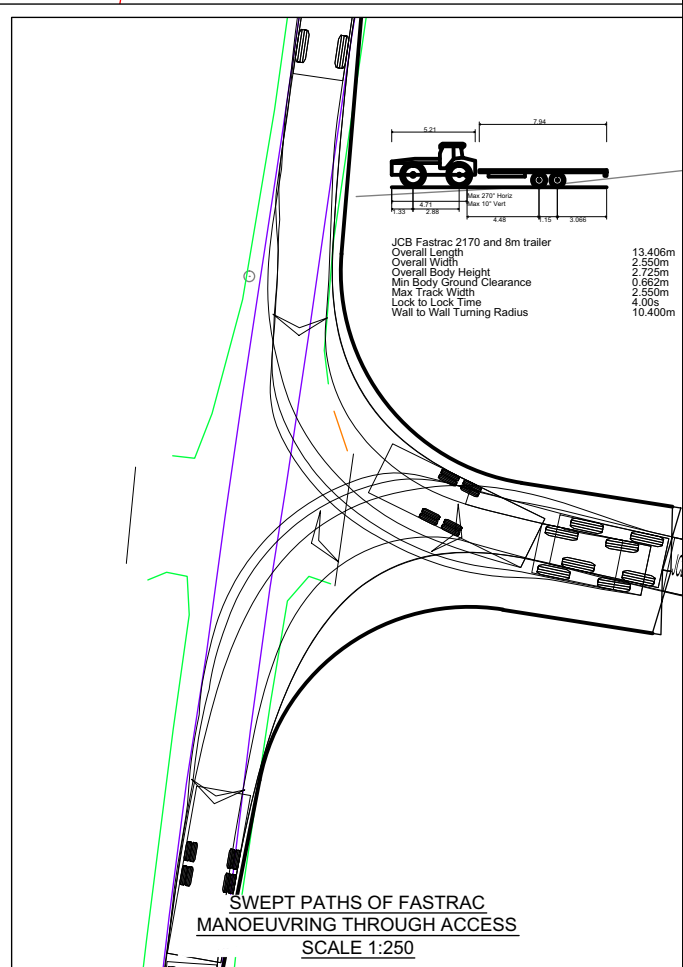
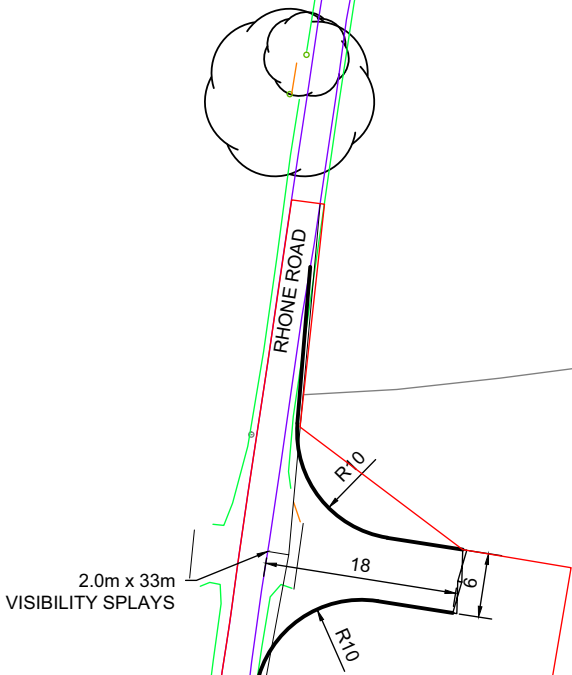


NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

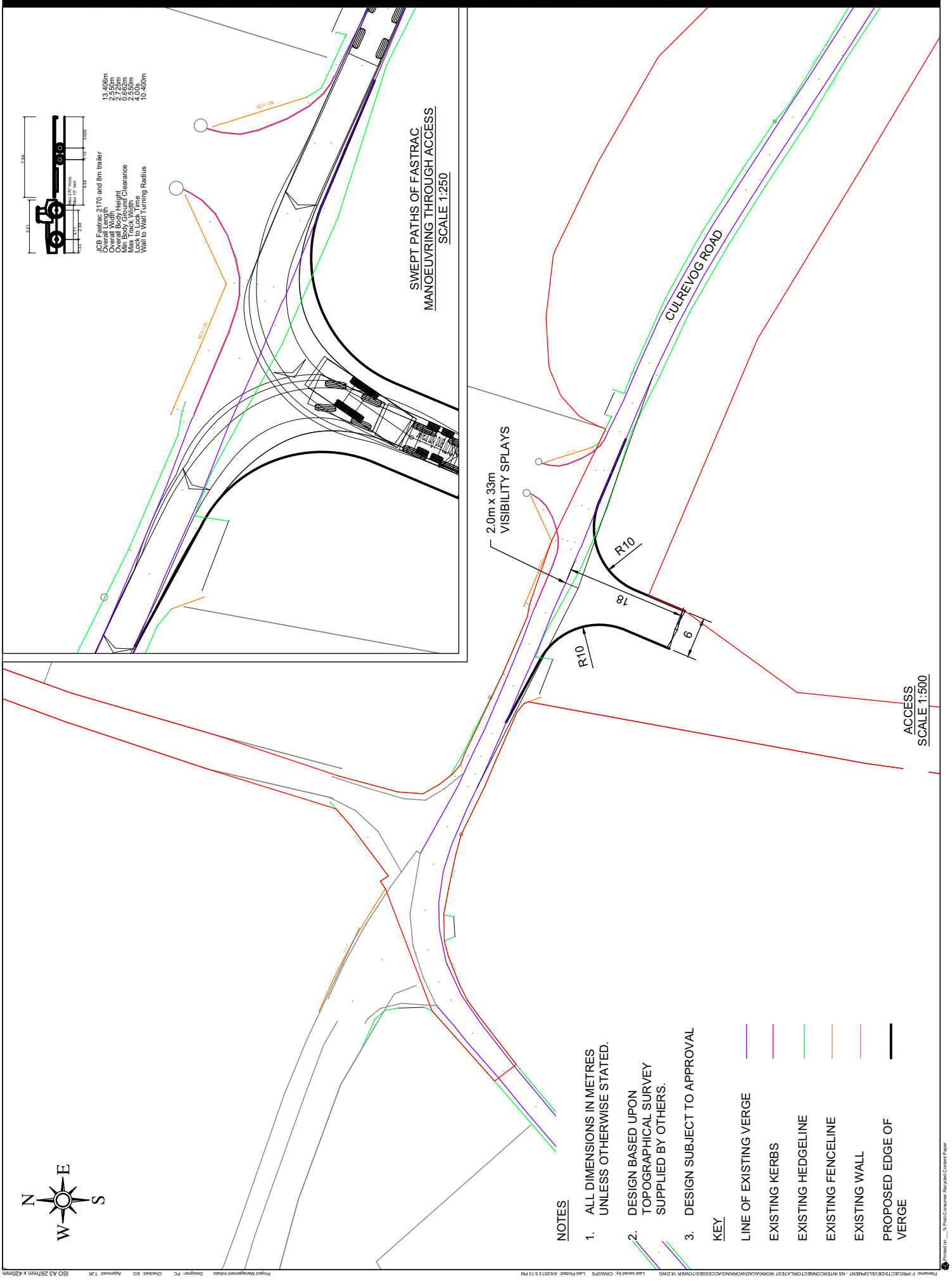
KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —



ACCESS
SCALE 1:500

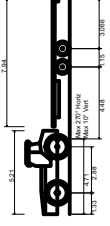
SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250



ACCESS
SCALE 1:500

SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250

- JCB Fastrac 2170 and 8m trailer
- Overall Length 13.400m
- Overall Width 2.725m
- Overall Body Height 2.725m
- Min Body Ground Clearance 0.662m
- Min Wheel Ground Clearance 0.662m
- Lock to Lock Time 4.008
- Wall to Wall turning Radius 10.400m



NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE

Project Management: Designer: PC Checked: EG Approved: TJR
 File Name: F:\PROJECTS\DEVELOPMENT - NS INTERCONNECTOR\PLATE TEST WORK\CAVAN\WORKING\ACCESS\TOWER 1024WG Last saved by: 2046PS Last Printed: 4/20/15 5:17 PM
 Printed on 100% Post-Consumer Recycled Content Paper



NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —

NOTE BT POLE TO BE RELOCATED

2.0m x 33m VISIBILITY SPLAYS

CULREVOG ROAD

R10

R10

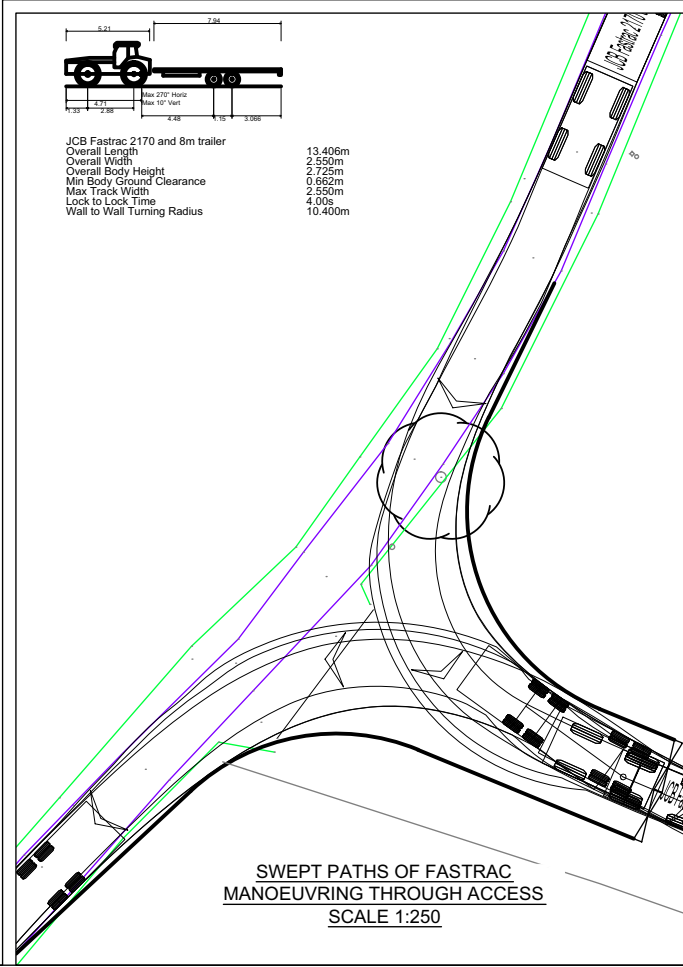
18

5

ANAGASANA A

GLEBB E

ACCESS
SCALE 1:500



SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250



60032220

TYRONE - CAVAN INTERCONNECTOR

TOWER ACCESS DRAWINGS

AT19



TULLYDOWEY ROAD

2.0m x 33m
VISIBILITY SPLAYS

R10

5.5

R3

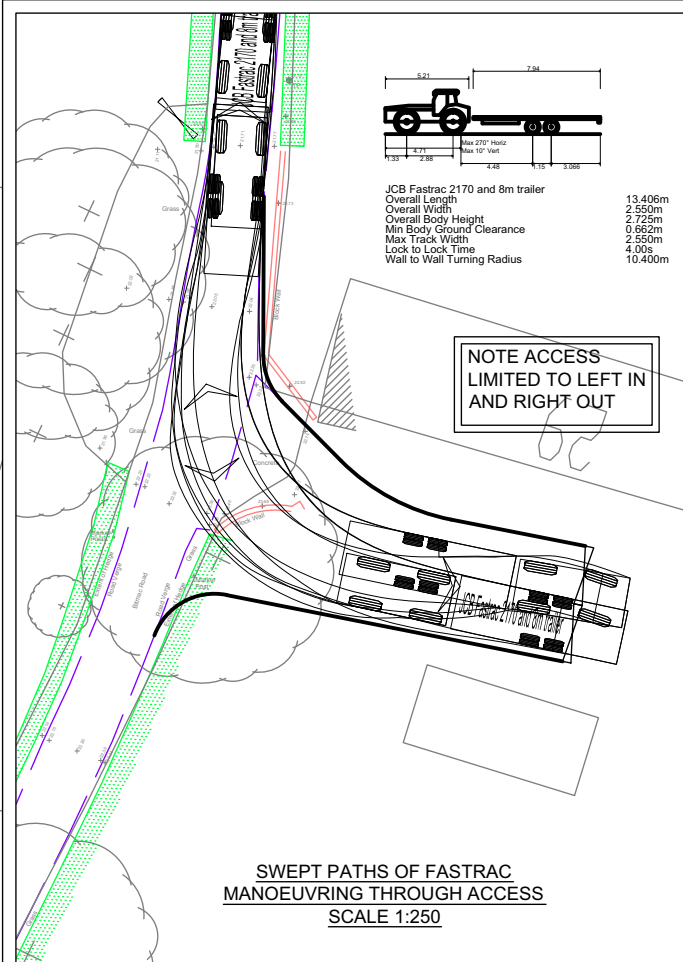
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —

ACCESS
SCALE 1:500



NOTE ACCESS
LIMITED TO LEFT IN
AND RIGHT OUT

SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250

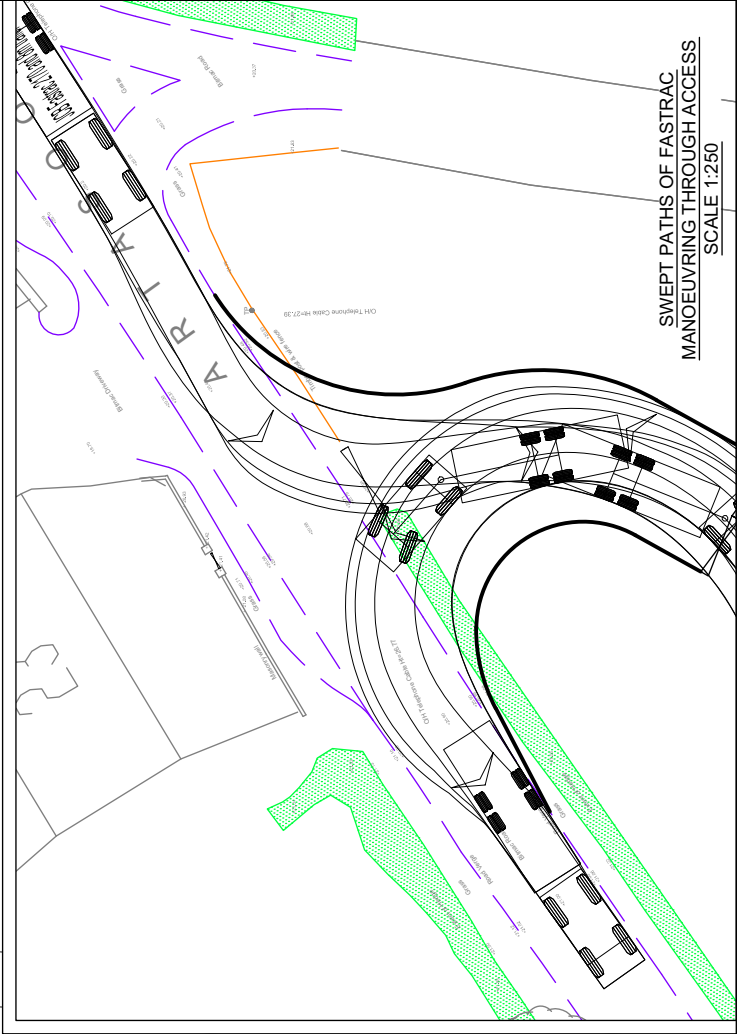
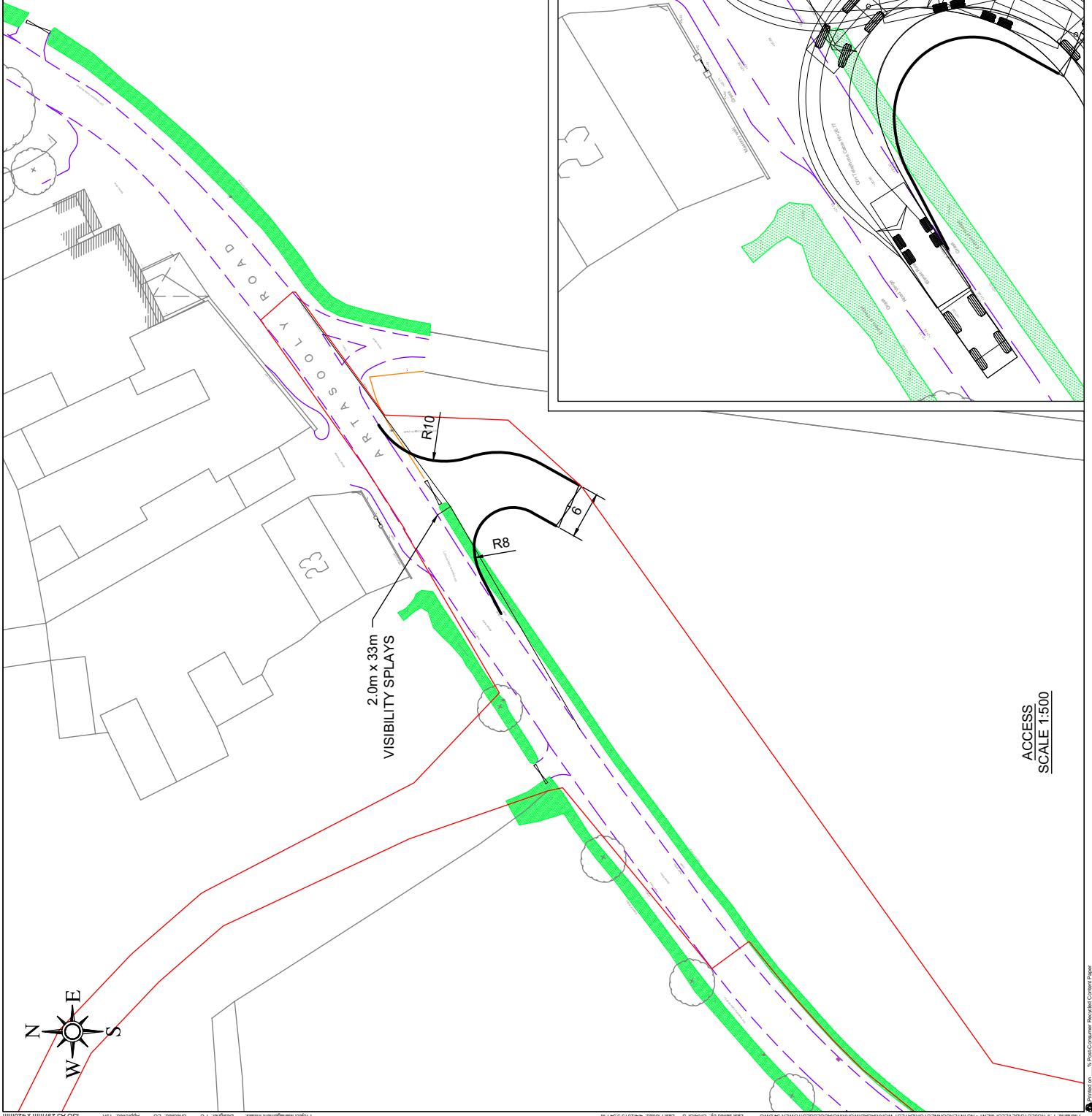
HARRISON'S DRAWING

NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

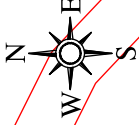
KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL

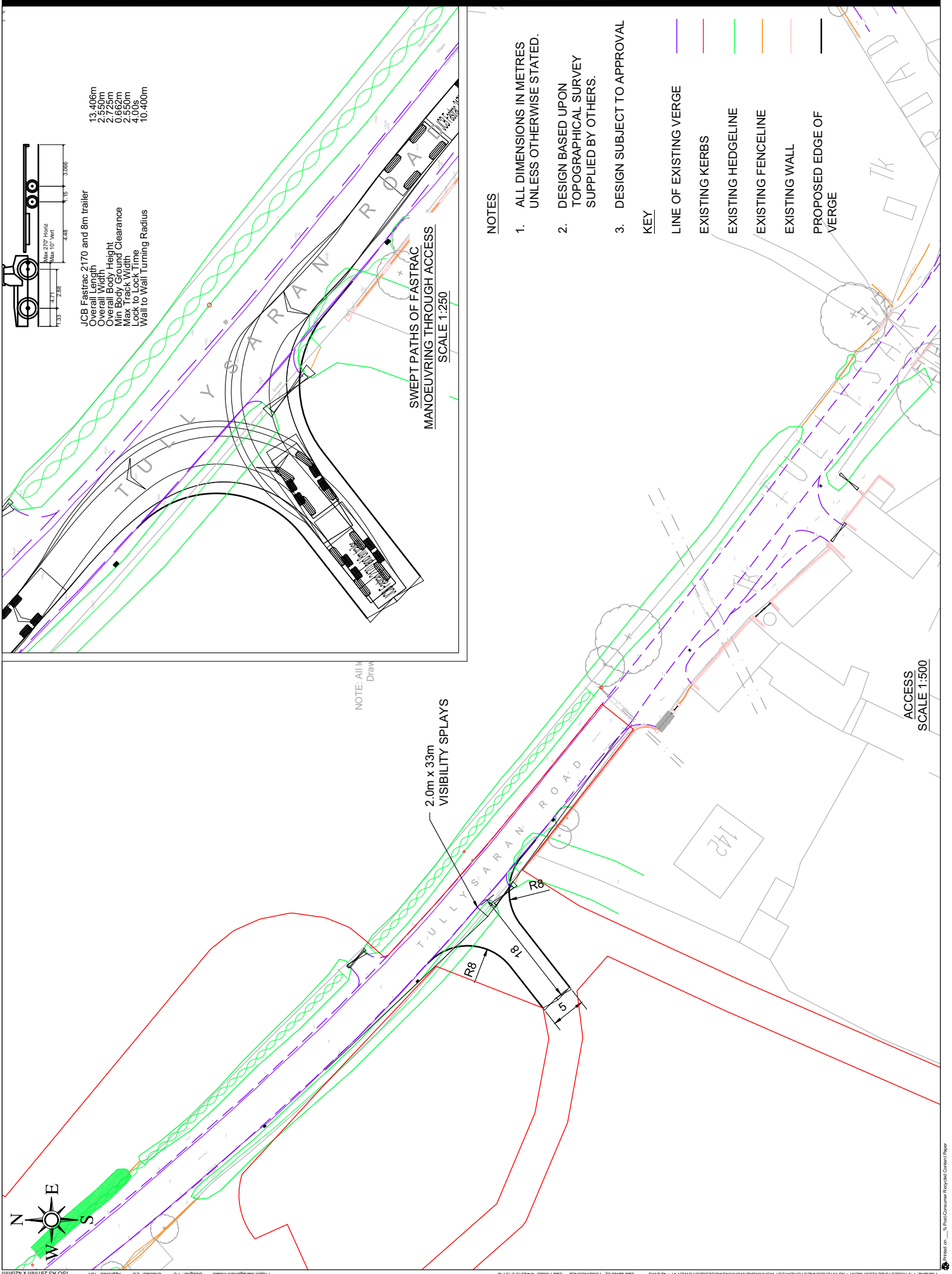


ACCESS
SCALE 1:500

SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250



TYRONE - CAVAN INTERCONNECTOR



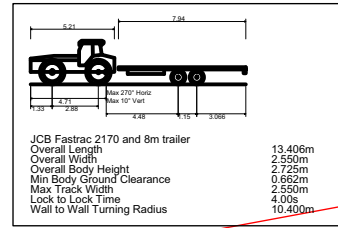


NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED VERGE LINE —



2.0m x 33m
VISIBILITY SPLAYS

BRACKNAGH ROAD

R8

28

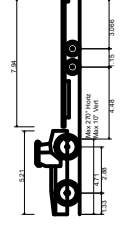
R10



**SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250**

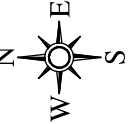
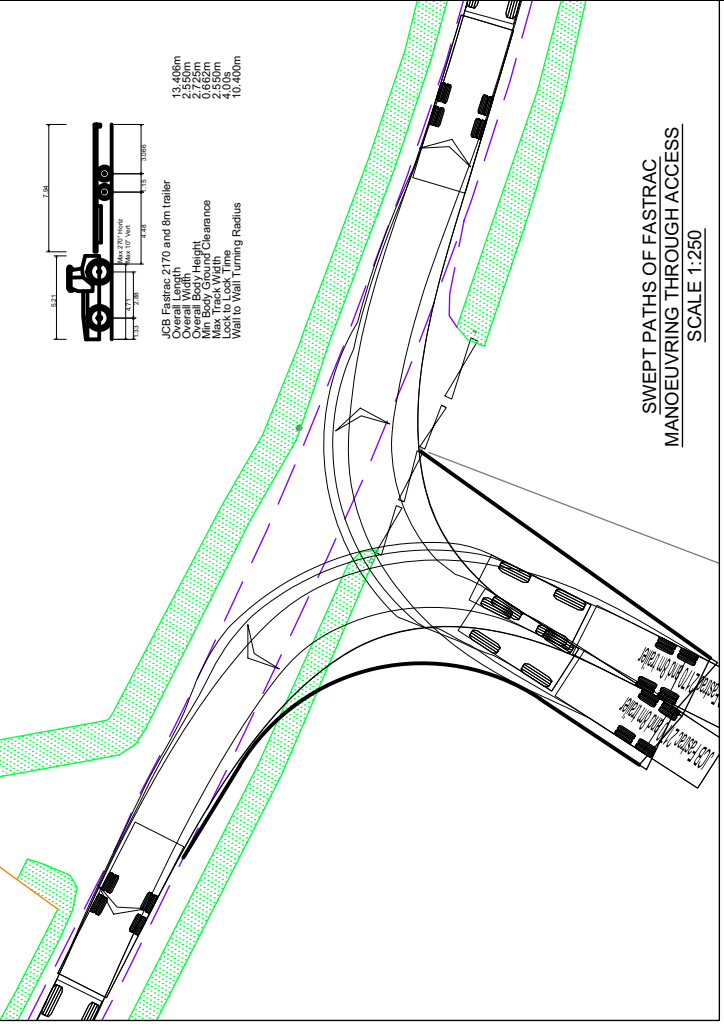
**ACCESS
SCALE 1:500**

TYRONE - CAVAN INTERCONNECTOR



JCB Fastrac 2170 and 8m trailer
 Overall Length 13.406m
 Overall Body Height 2.725m
 Min. Body Ground Clearance 2.550m
 Lock to Lock Time 4.00s
 Wall to Wall Turning Radius 10.400m

SWEPT PATHS OF FASTRAC
 MANOEUVRING THROUGH ACCESS
 SCALE 1:250



ACCESS
 SCALE 1:500

NOTES

- ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- DESIGN SUBJECT TO APPROVAL

KEY

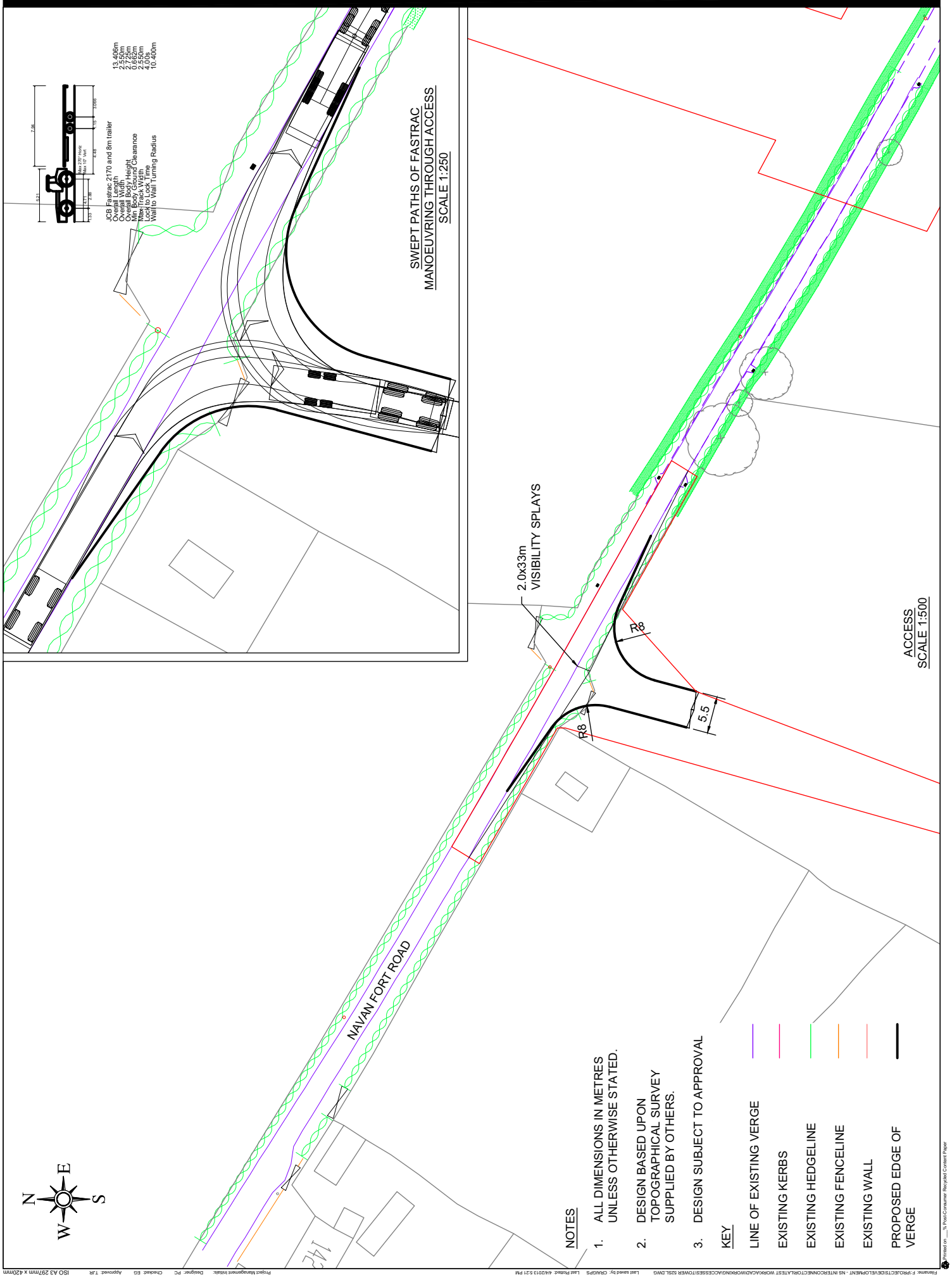
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE

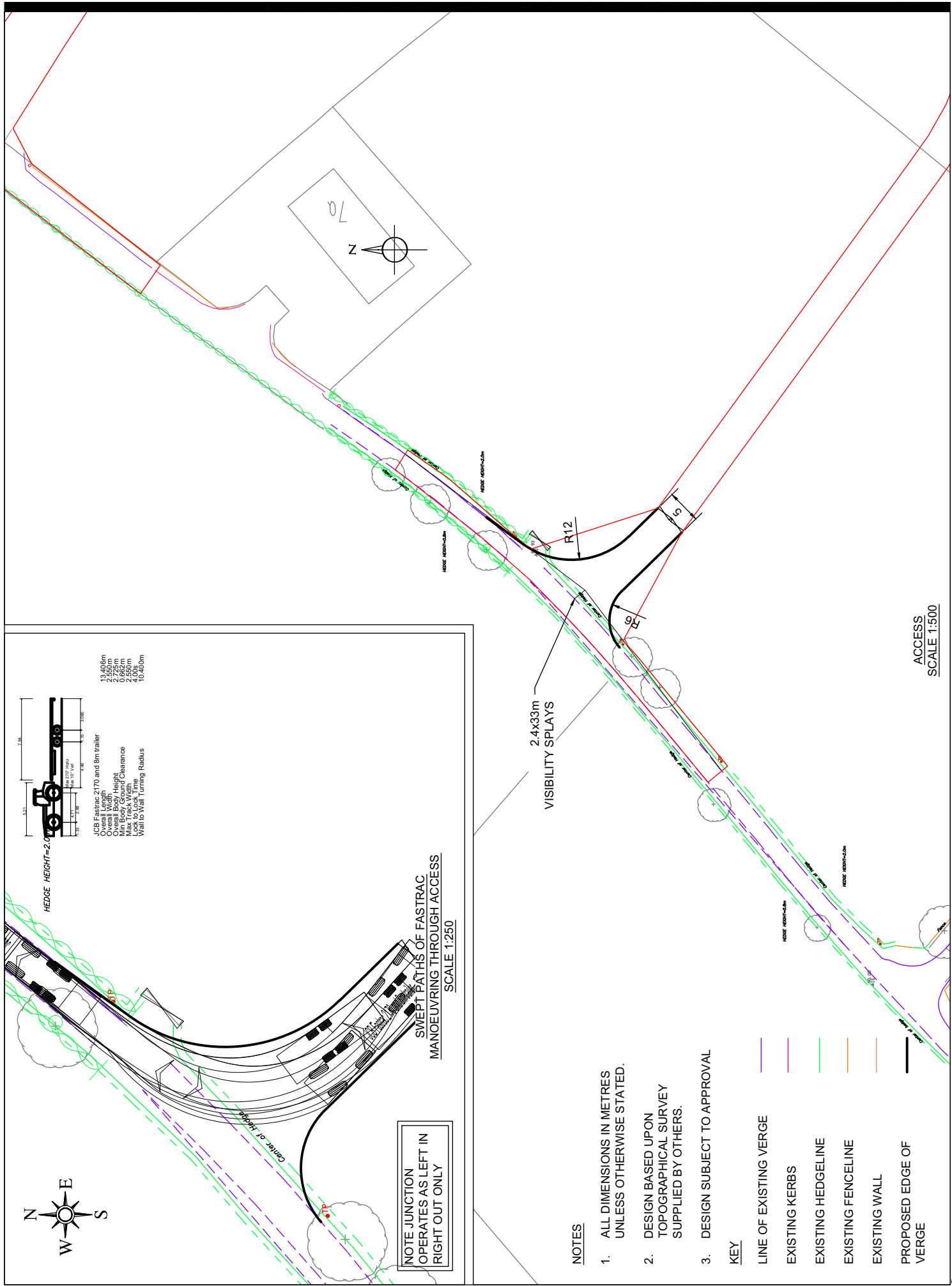
2.0x33m
VISIBILITY SPLAYS

R10

VISIBILITY SPLAY TANGENTIAL TO BACK OF VERGE

NAVAN FORT ROAD





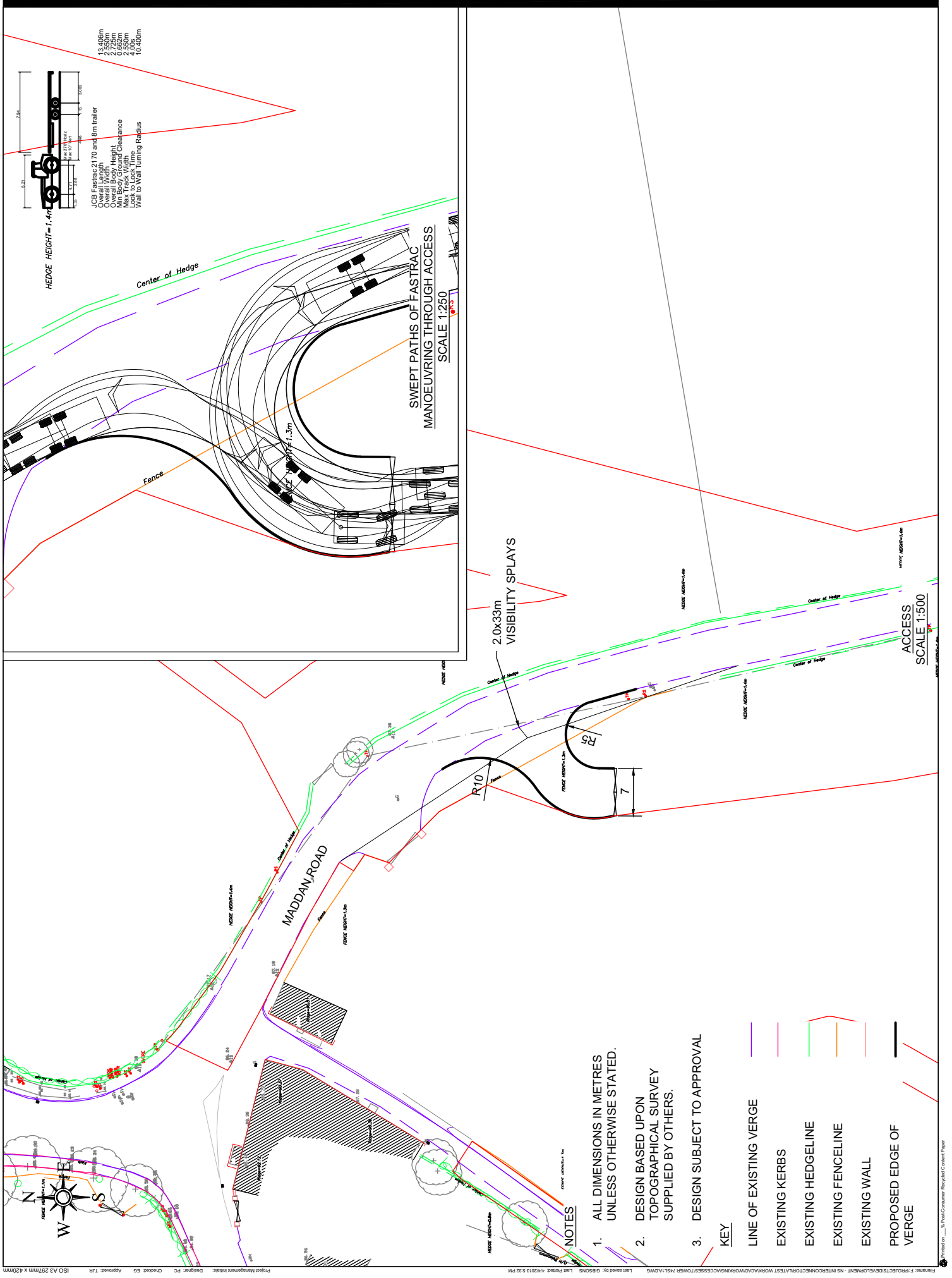
ACCESS SCALE 1:500

SCALE 1:250
MANOEUVRING THROUGH ACCESS

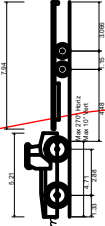
NOTE JUNCTION OPERATES AS LEFT IN RIGHT OUT ONLY

- NOTES**
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
 3. DESIGN SUBJECT TO APPROVAL

- KEY**
- LINE OF EXISTING VERGE
 - EXISTING KERBS
 - EXISTING HEDGELINE
 - EXISTING FENCELINE
 - EXISTING WALL
 - PROPOSED EDGE OF VERGE



JCB Fastrac 2170 and 8m trailer
 Overall Width: 2.550m
 Overall Height: 6.662m
 Min Body Ground Clearance: 2.550m
 Max Track Width: 10.400m
 Wheel to Wall Turning Radius

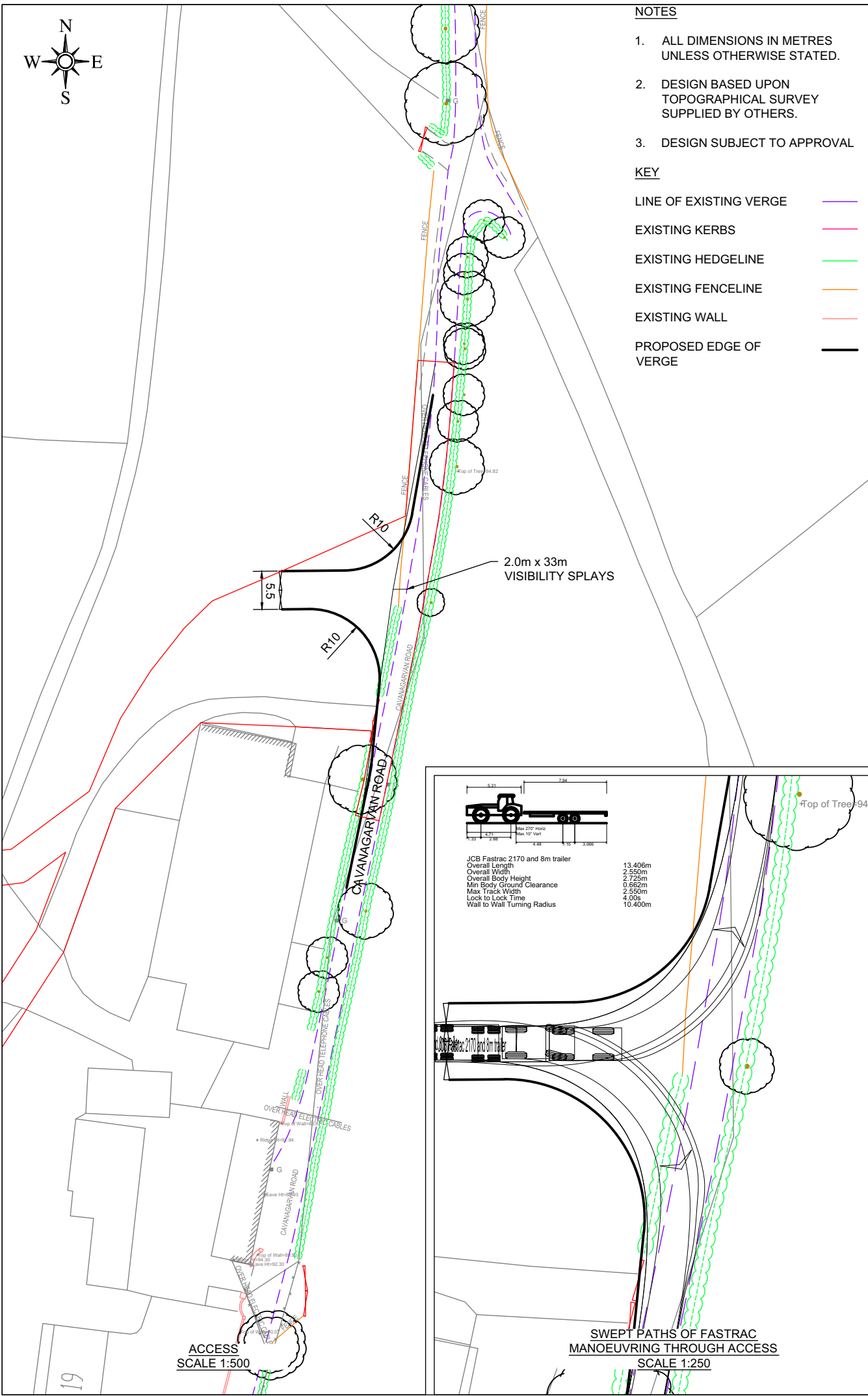


SWEPT PATHS OF FASTRAC
 MANOEUVREING THROUGH ACCESS
 SCALE 1:250

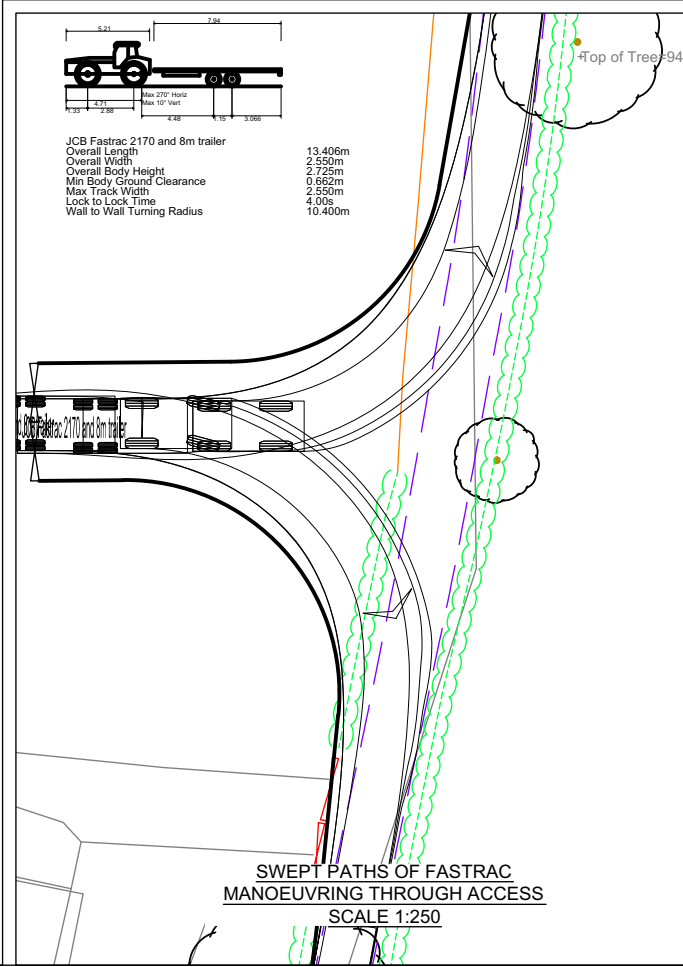
ACCESS
 SCALE 1:500

- NOTES**
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
 3. DESIGN SUBJECT TO APPROVAL

- KEY**
- LINE OF EXISTING VERGE
 - EXISTING KERBS
 - EXISTING HEDGELINE
 - EXISTING FENCELINE
 - EXISTING WALL
 - PROPOSED EDGE OF VERGE



ACCESS
SCALE 1:500



SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250

- NOTES**
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
 3. DESIGN SUBJECT TO APPROVAL

KEY

LINE OF EXISTING VERGE	—
EXISTING KERBS	—
EXISTING HEDGELINE	—
EXISTING FENCELINE	—
EXISTING WALL	—
PROPOSED EDGE OF VERGE	—

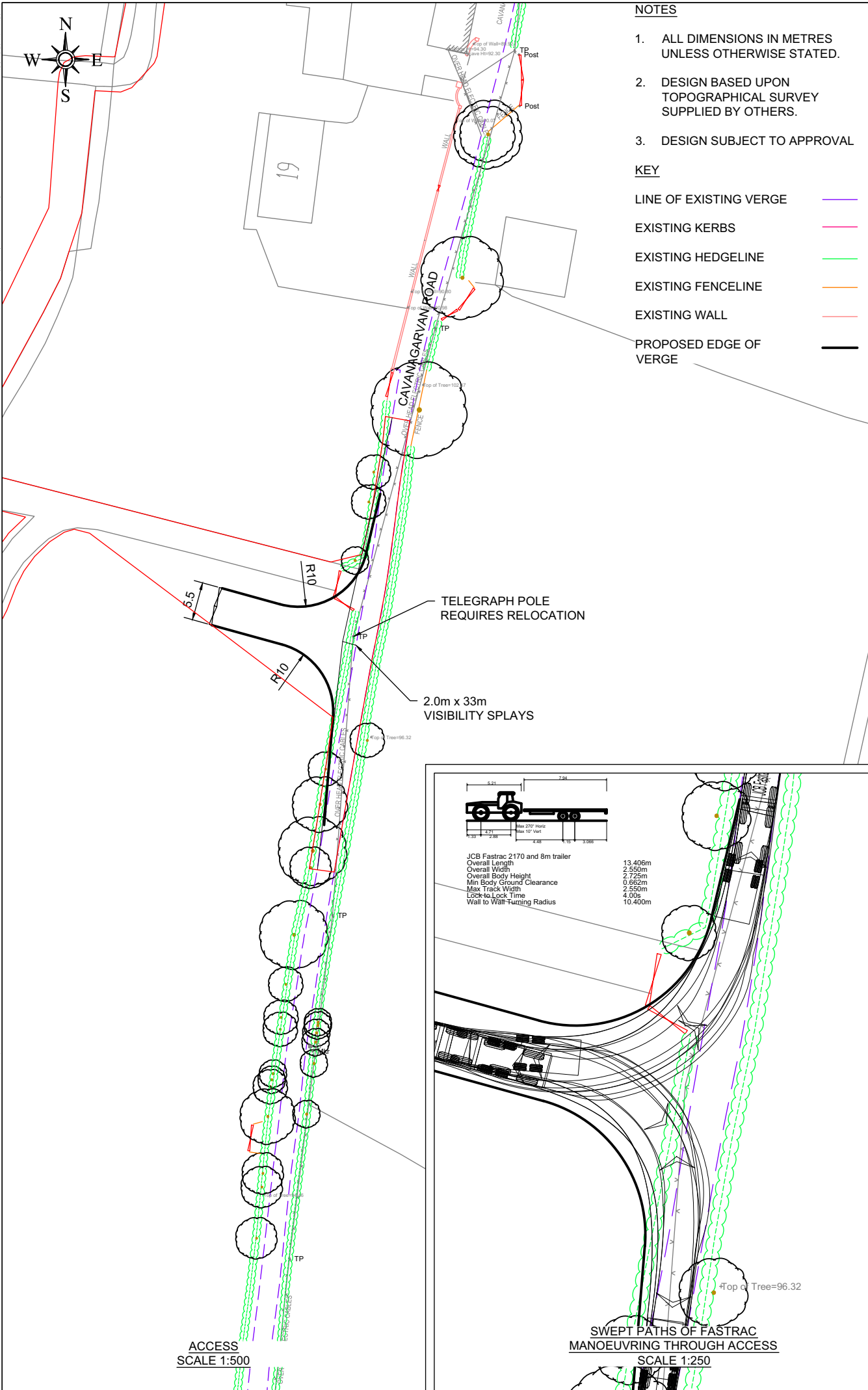
TYRONE - CAVAN INTERCONNECTOR

TOWER ACCESS DRAWINGS

AT78A



60032220

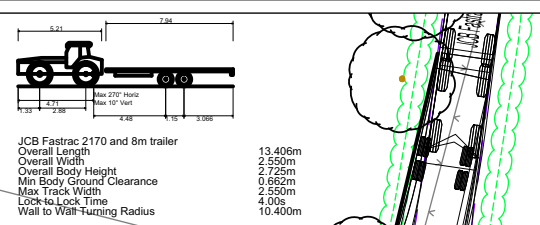


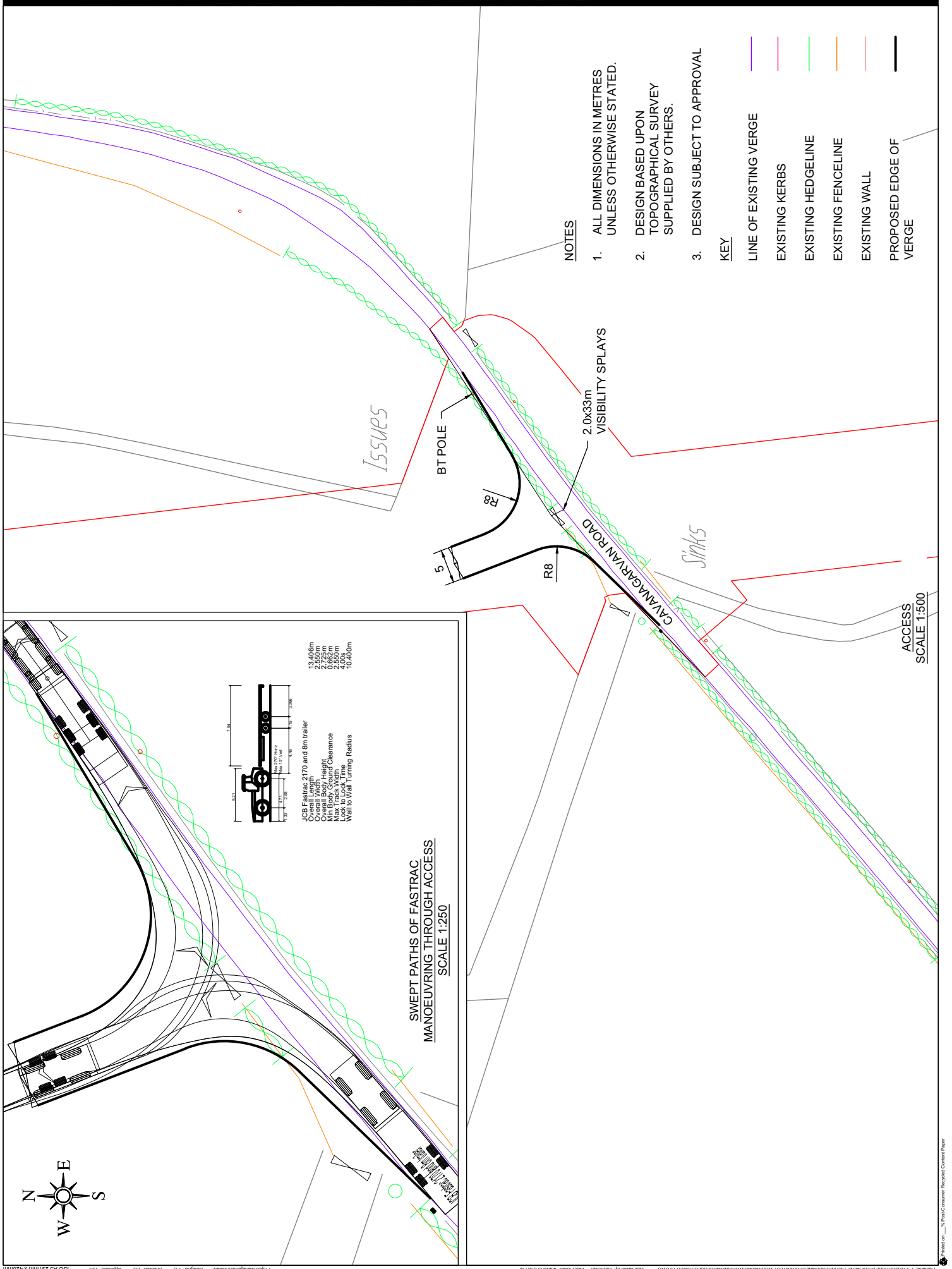
- NOTES**
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
 3. DESIGN SUBJECT TO APPROVAL

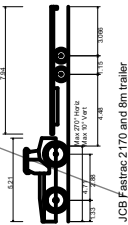
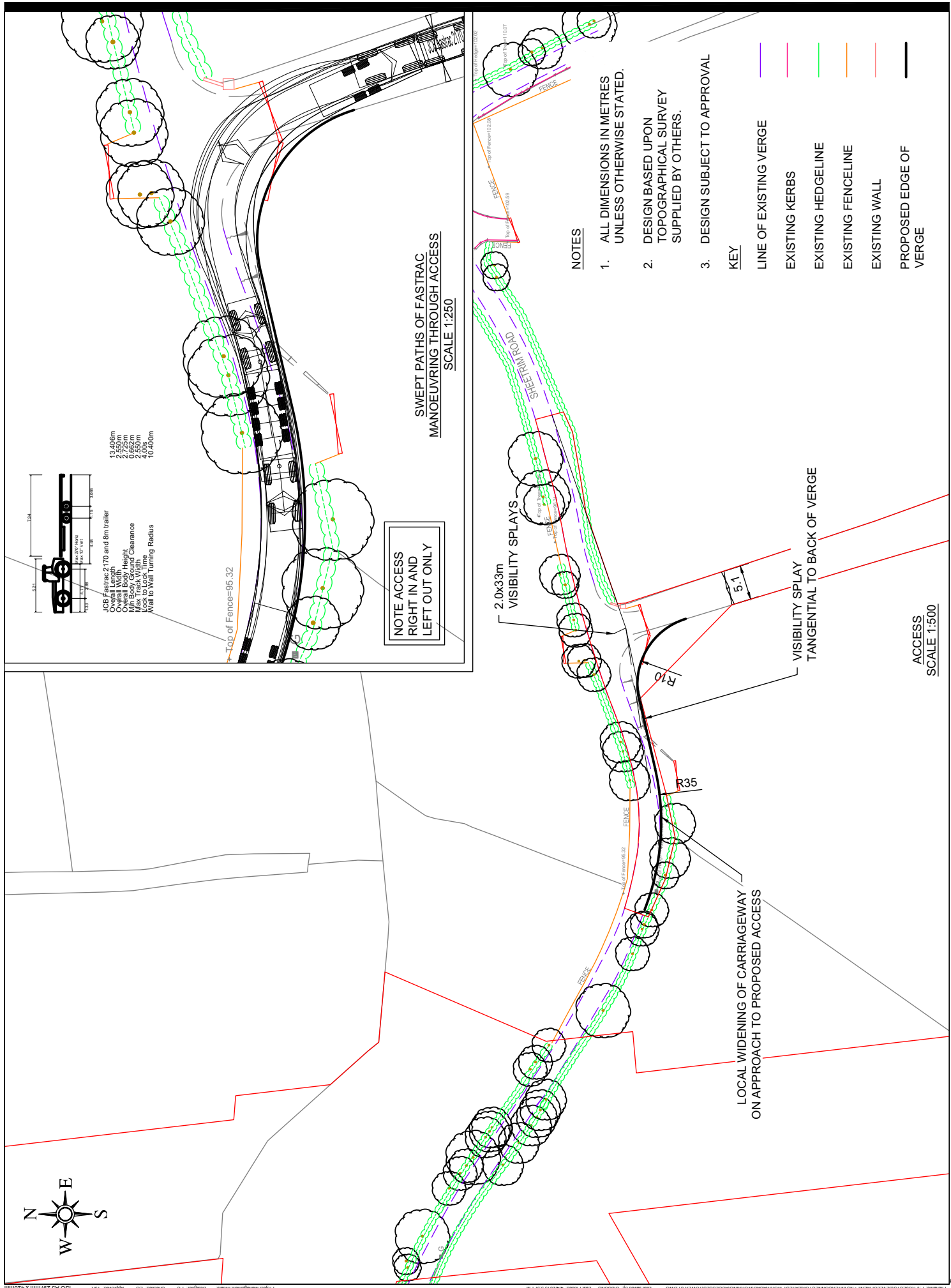
- KEY**
- LINE OF EXISTING VERGE
 - EXISTING KERBS
 - EXISTING HEDGELINE
 - EXISTING FENCELINE
 - EXISTING WALL
 - PROPOSED EDGE OF VERGE

ACCESS SCALE 1:500

SWEPT PATHS OF FASTRAC MANOEUVRING THROUGH ACCESS SCALE 1:250







USB Fastrac 2.170 and 8m trailer
 Overall Length 13.408m
 Overall Width 2.550m
 Max Body Height 0.662m
 Max Track Width 2.250m
 Max Body Ground Clearance 0.250m
 Wheel to Wheel Turning Radius 10.400m

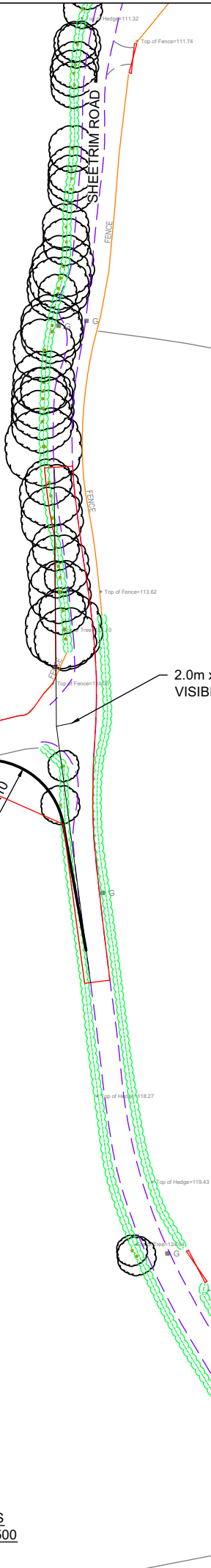
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE





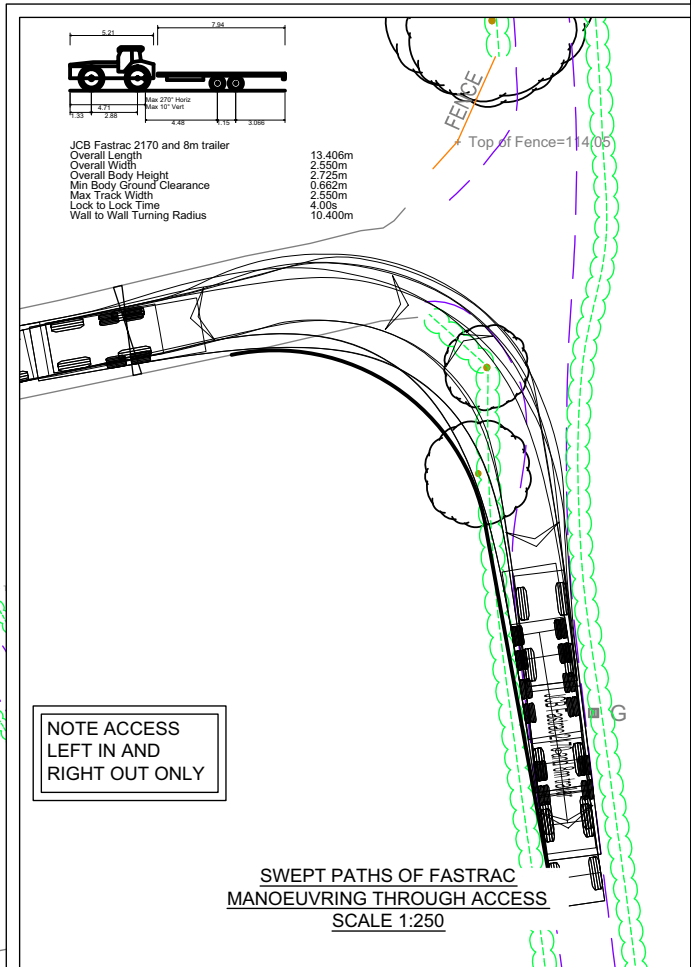
2.0m x 33m
VISIBILITY SPLAYS

NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

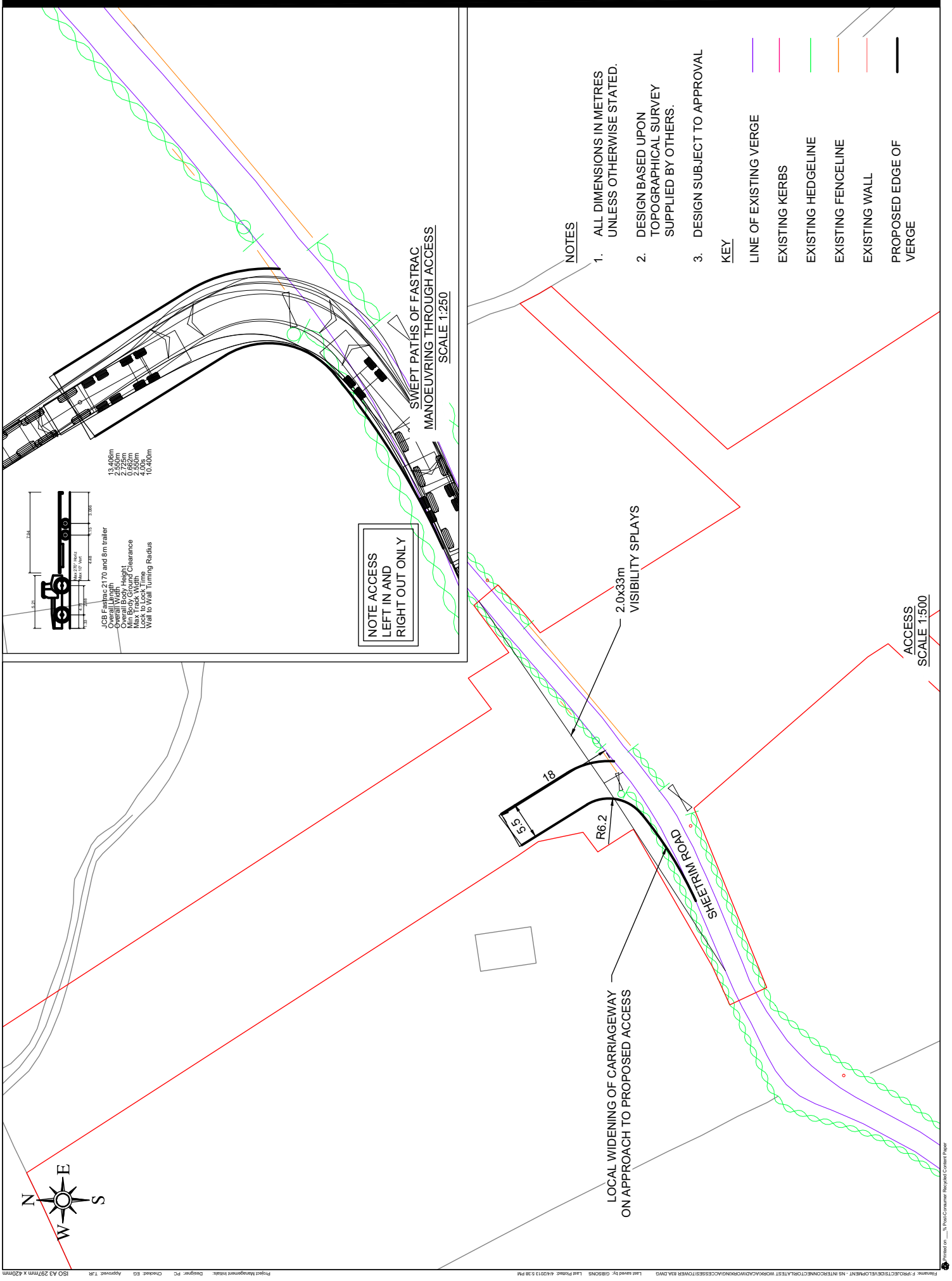
- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —



NOTE ACCESS
LEFT IN AND
RIGHT OUT ONLY

SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250

ACCESS
SCALE 1:500



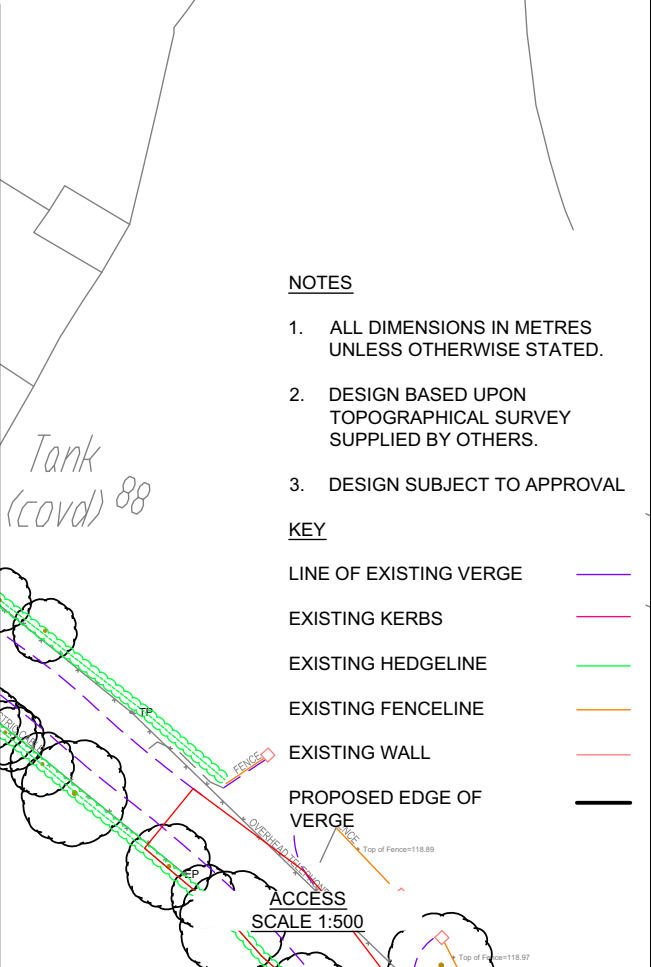
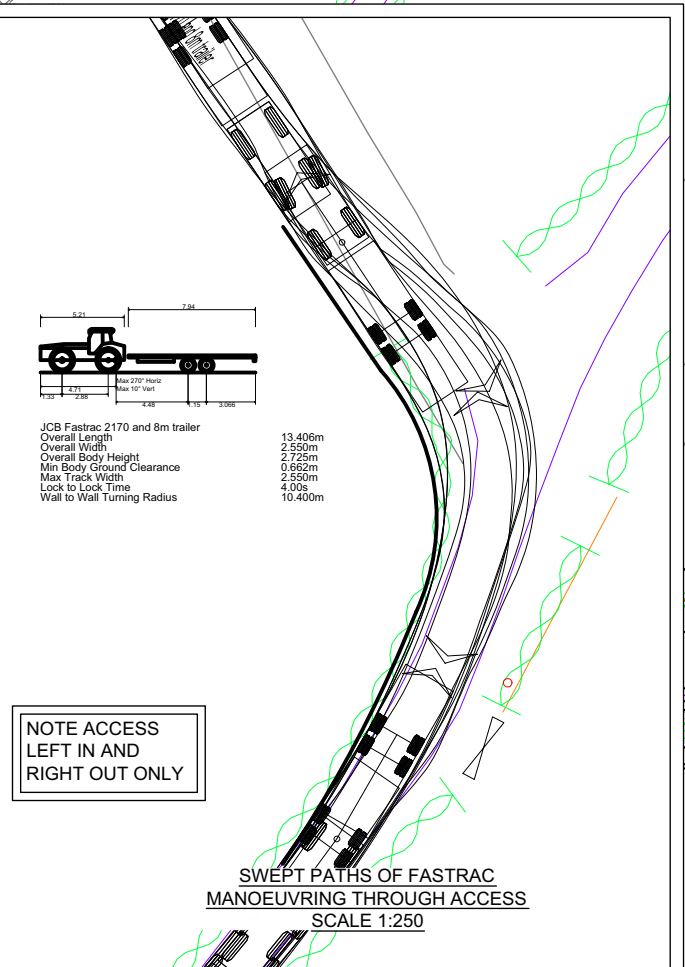
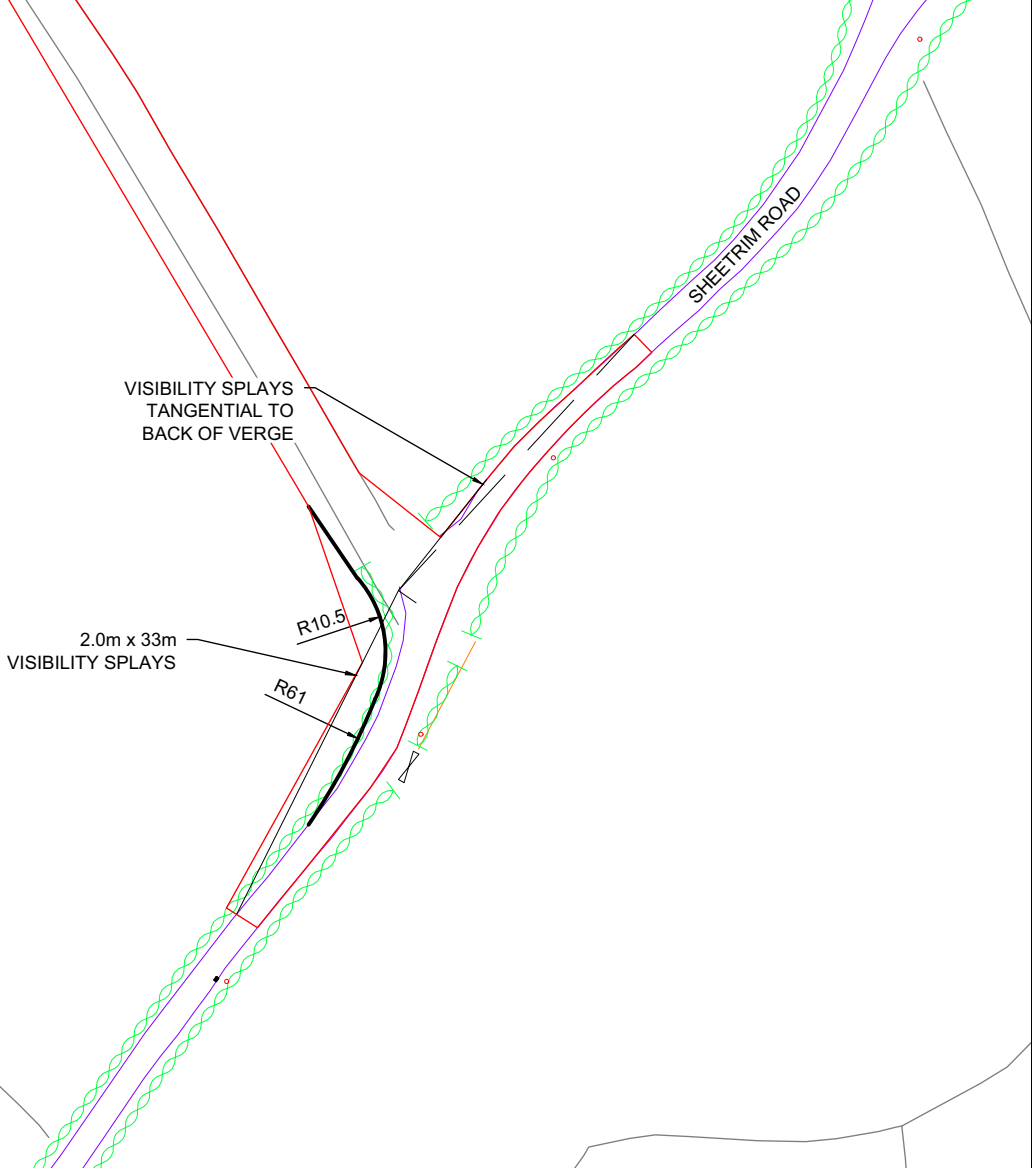
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

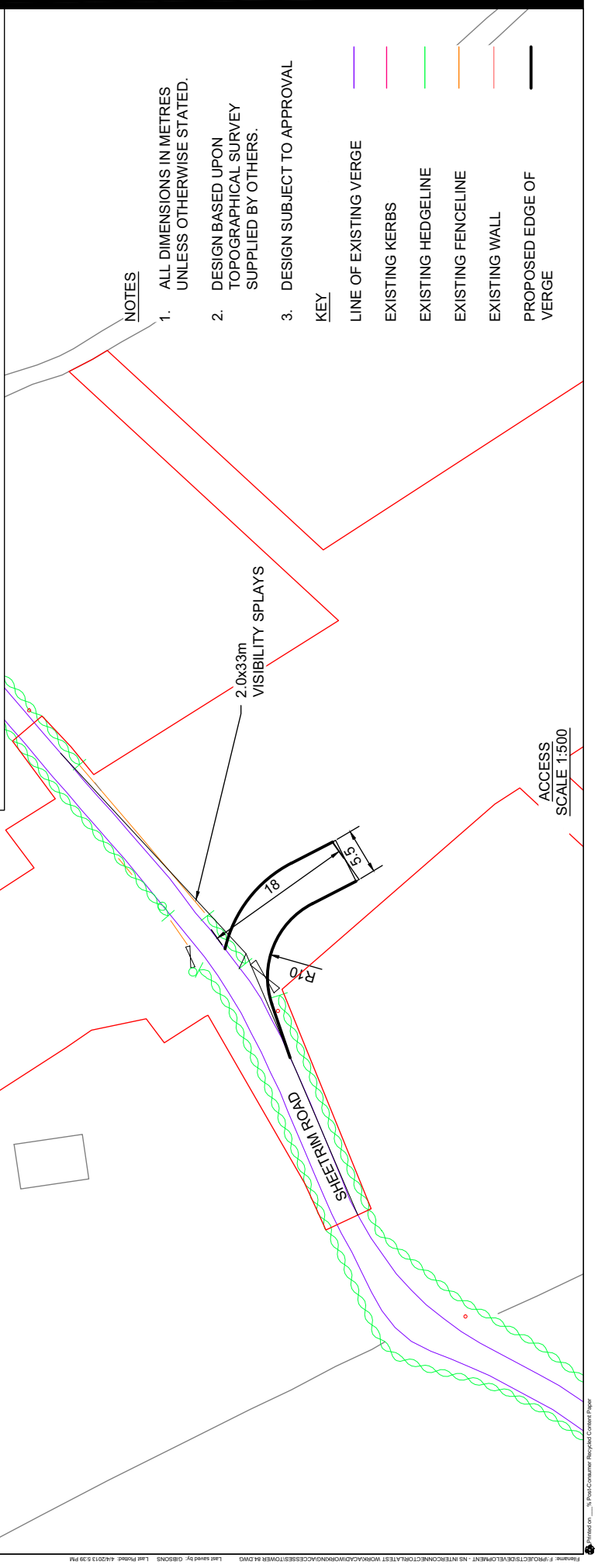
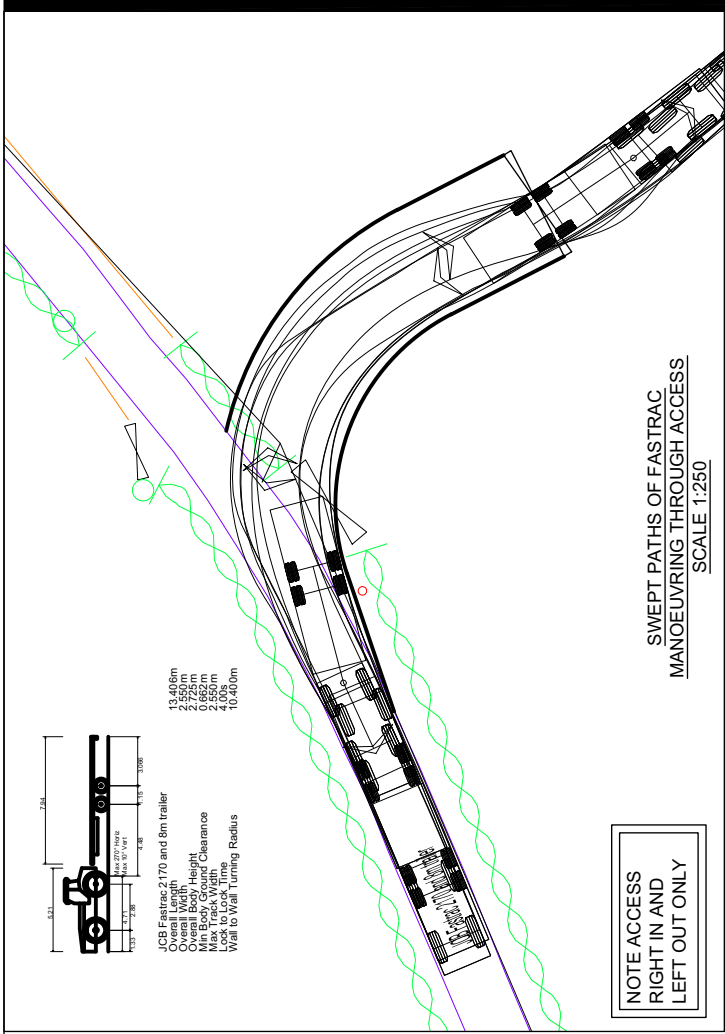
- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE

ACCESS SCALE 1:500



- NOTES**
- ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
 - DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
 - DESIGN SUBJECT TO APPROVAL

- KEY**
- LINE OF EXISTING VERGE
 - EXISTING KERBS
 - EXISTING HEDGELINE
 - EXISTING FENCELINE
 - EXISTING WALL
 - PROPOSED EDGE OF VERGE



NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGE LINE
- EXISTING FENCE LINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE



2.0m x 33m
VISIBILITY SPLAYS

GLASSRUMMOND ROAD

Mkr

R10

4.8

R08

SWire

TP

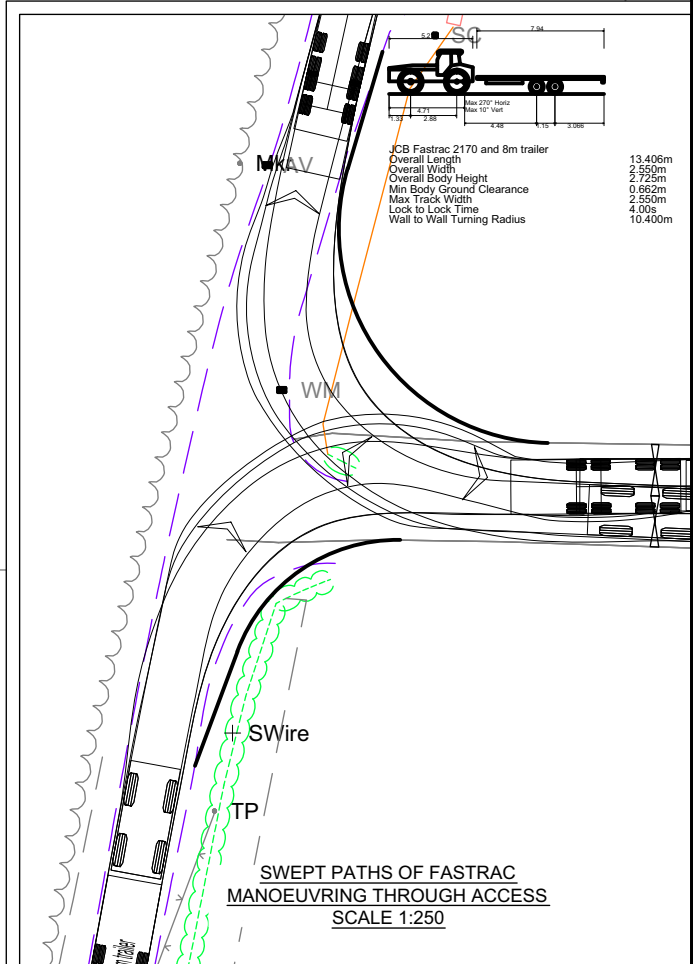
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

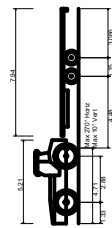
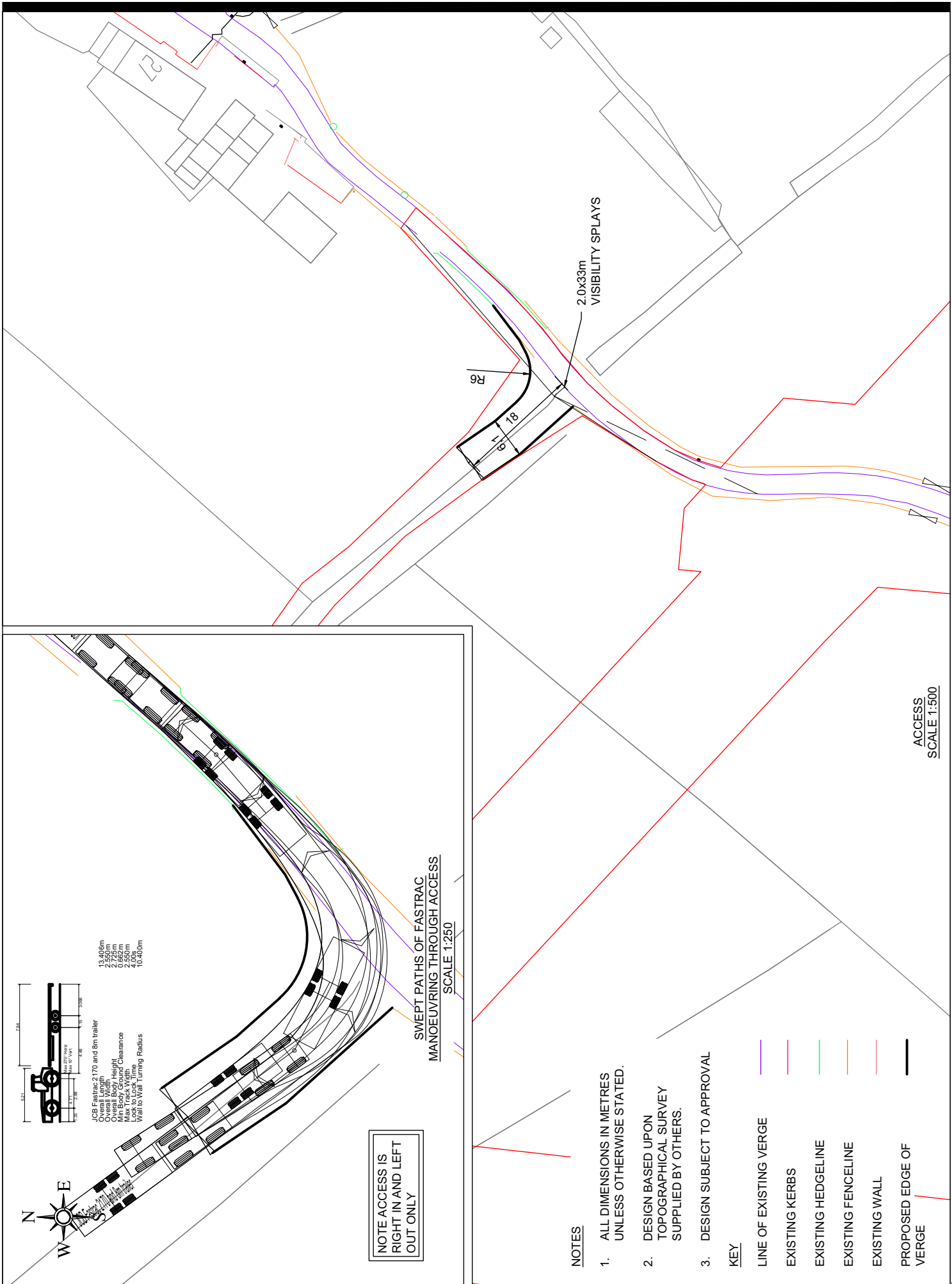
KEY

- LINE OF EXISTING VERGE —
- EXISTING KERBS —
- EXISTING HEDGELINE —
- EXISTING FENCELINE —
- EXISTING WALL —
- PROPOSED EDGE OF VERGE —

ACCESS
SCALE 1:500



SWEPT PATHS OF FASTRAC
MANOEUVRING THROUGH ACCESS
SCALE 1:250



- GCB Fastrac 2170 and 6m trailer
- Overall Length 13.406m
- Overall Width 2.550m
- Min Body Height 2.550m
- Min Body Ground Clearance 0.665m
- Max Track Width 2.550m
- Wall to Wall Turning Radius 10.400m

SWEEPED PATHS OF FASTRAC
MANOEUVREING THROUGH ACCESS
SCALE 1:250

NOTE ACCESS IS
RIGHT IN AND LEFT
OUT ONLY

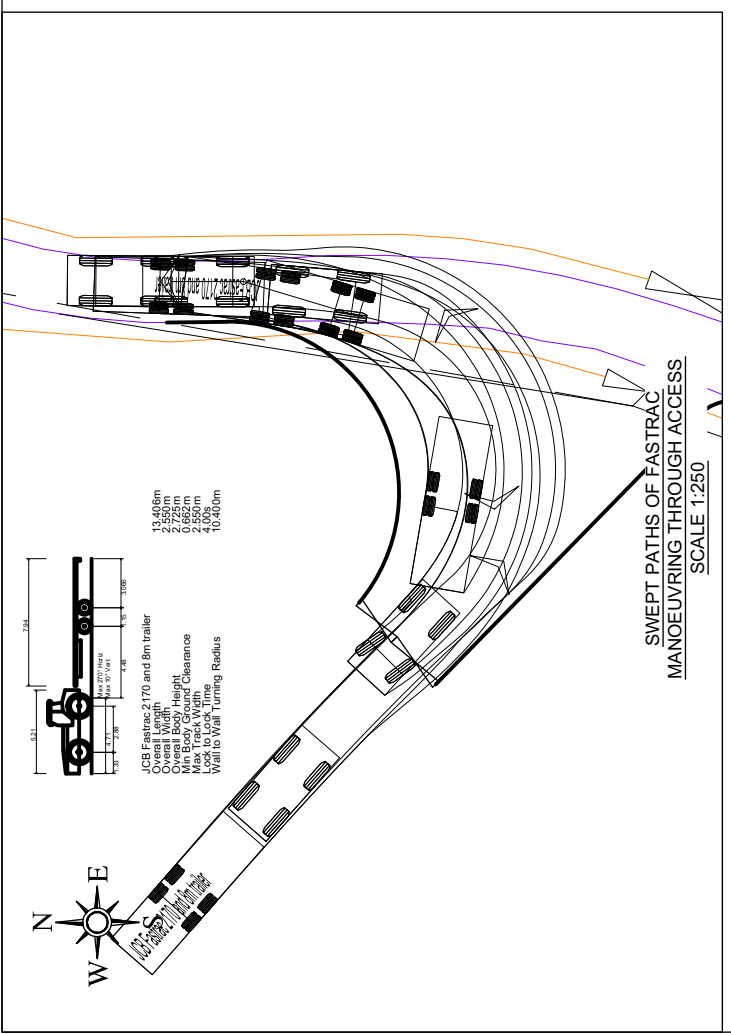
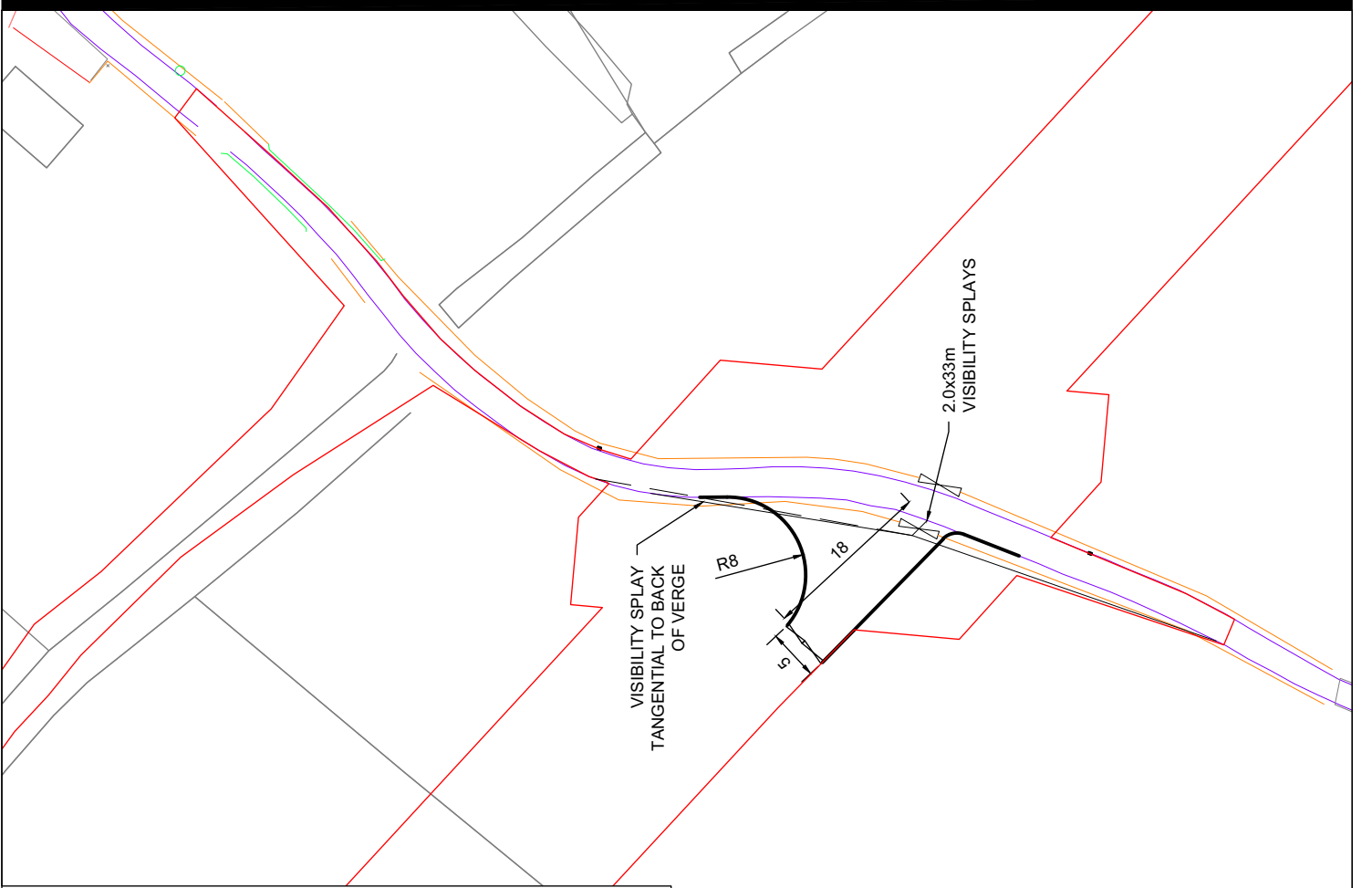
NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE

ACCESS
SCALE 1:500



SWEPT PATHS OF FASTRAC MANOEUVRING THROUGH ACCESS SCALE 1:250

NOTES

- 1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
- 2. DESIGN BASED UPON TOPOGRAPHICAL SURVEY SUPPLIED BY OTHERS.
- 3. DESIGN SUBJECT TO APPROVAL

KEY

- LINE OF EXISTING VERGE
- EXISTING KERBS
- EXISTING HEDGELINE
- EXISTING FENCELINE
- EXISTING WALL
- PROPOSED EDGE OF VERGE

ACCESS SCALE 1:500

Annex 11 - Construction Traffic Management Plan

TA Annex 11: Construction Traffic Management Plan

Introduction

A Construction Traffic Management Plan (CTMP) is a framework document for ensuring work activities in, near or having impact upon the public highway, are undertaken safely and with minimal impact on traffic movement and existing infrastructure throughout the works programme

The CTMP is a live 'working' document that will be responsive to changing construction activities throughout the works. It is likely that the programme of works will stretch beyond substantial completion of construction activities to cover, snagging and commissioning activities. The CTMP will cover this and may also be extended to form part of the operation and maintenance plan component of the Safety File. The CTMP will only cease to be a working document on full completion of the works.

The following text provides a synopsis of the CTMP format and presents the key features that will be incorporated into the plan through its life.

CTMP Framework

The CTMP will primarily be prepared in two stages, with each stage approved by Roads Service:

- Stage 1 prepared at Design Stage by the Design Team
- Stage 2 prepared at Construction Stage by the Contracting team

As highlighted above the CTMP may be developed further into a third stage of incarnation and form part of the long term operational plan for the constructed works. This will be in full agreement again with Roads Service.

The plan itself will not only address the generalities of health and safety but will also provide guidance on methodologies, formalities, licensing and approval procedures all aimed at reducing the risk of impact on operatives, the general public and the efficient operation of the surrounding public highway. The following categories will form the basis of the CTMP:

- Contact Personnel, Notification & Licensing
- Overseeing Authority and Statutory Procedures
- Duties imposed by Legislation, Regulation and Codes of Practice
- Design and Site Specific Constraints
- Localised Temporary Traffic Control
- Accessibility to the individual construction sites from the public highway (both temporary and permanent).
 - Permanent accesses being designed in accordance with the Planning Service Development Advice Note 15 "Vehicular Access Standards" or DMRB Volume 6 Section 2 Part 6 TD41/95 "Geometric Design of Major/Minor Priority Junctions".
 - Temporary accesses, where applicable, being designed in accordance with Chapter 8 of the Traffic Signs Manual.
- Temporary Parking Provision
- Emergency Procedures
- Maintenance Plan for the Public Highway

- Appendices with relevant information such as traffic data, planned events and security measures.

Another fundamental component of the CTMP is the preparation of drawings and specifications clearly documenting the construction process and the management of the local traffic through the course of the main construction works at each of the individual access points. This set of option/scheme drawings will be developed into detail drawings by the selected contractor, to ensure the works are undertaken in clear and progressive manner. The contractor will also develop the Design Stage Plan and make certain that the minimum standards established at stage 1 are developed sufficiently for construction. Any development of the CTMP prior to commencement of construction must be approved in writing by the Overseeing Authority. Further expansion on these key elements is provided in the following sections.

Overseeing Authority, Statutory Duty and Consultation

In Northern Ireland the Overseeing Authority, and body responsible for setting policy with respect to road based infrastructure and traffic management is ***The Department for Regional Development – Roads Service***. Roads Service will be consulted in advance of, and throughout, the preparation of the Design Stage CTMP and liaised with at all stages through the course of the works by the selected contractor and employer's representative.

In order to fulfil their obligations, Road Service will provide direction in respect of policy and legislation as it dictates the production and implementation of the CTMP. Roads Service, as Overseeing Authority, must ensure that current policy and legislation are being applied throughout.

The following legislation is relevant to the preparation of the CTMP and imposes duties on the Overseeing Authority and Statutory Undertakers (and or their agents) in respect of Temporary Traffic Management and the impact of works on the public highway:

- The Street Works (Northern Ireland) Order 1995
- The Street Works (Amendment) (Northern Ireland) Order 2007
- The Road Traffic Regulation (Northern Ireland) Order 1997

In addition to Road Service, and as part of the overall consultation process, all statutory bodies and key stakeholders will be consulted. Any issues or concerns raised will be written into the CTMP together with appropriate and agreed mitigation measures. A non-exhaustive list of those parties that will be consulted is provided below:

- Landowners
- PSNI
- NIEA
- Waterways Ireland
- Rivers Agency
- Local Government Departments
- Other Statutory Undertaker

Works Description

The NIE Tyrone Cavan Interconnector Project, 'the Works', are to be undertaken by a Statutory Undertaker, Northern Ireland Electricity (NIE). NIE are a licensee under The Street Works (Northern Ireland) Order 1995; and as such any works undertaken within the public highway can only be undertaken following provision of the required notice under the order, and approval of the Construction Stage CTMP by the Overseeing Authority. While the

majority of the proposed works will be outside the public highway boundary, the movement of construction traffic, deliveries and access arrangements will still require the approval of Roads Service prior to commencement. To ensure this progresses in a timely fashion, the Preliminary (Design Stage) CTMP will be agreed prior to the tendering process and contractor selection.

Any enabling works proposed that will impact on the public highway will also be accounted for within the CTMP and be undertaken to the satisfaction of Roads Service to comply fully with approved Codes of Practice. (e.g. All excavation and reinstatement will comply with the methods identified in the Northern Ireland Roads Authority Utilities Committee (NIRAUC) Specification.)

Temporary Traffic Control ‘the Works’

As identified earlier, the CTMP will be prepared in two stages. The Design Stage Plan will present options for the localised traffic routing, control and access to individual construction sites using temporary traffic management drawings and specifications in the form of a story board. This will be prepared in accordance with Chapter 8 of the Traffic Signs Manual. The design team will prepare the traffic control options as part of the Stage 1 CTMP, agree the core principles with Road Service and issue to tendering organisations.

In addition to the daily traffic movements for construction and delivery related tasks, account will be provided for the day to day parking provision (off road) and emergency procedures at each of the individual sites. On schemes of a progressive nature like this, the provision will often be on a rolling short term basis as opposed to a static provision for long durations.

The appointed contractor will be expected to develop the core principles presented in the Stage 1 CTMP and the localised temporary traffic control measures to facilitate the construction of the works. It is the responsibility of the contractor to ensure that all temporary traffic management proposals are agreed with Roads Service prior to commencement of the works. All activities must be clearly documented with the proposed routing of normal and construction traffic presented clearly to ensure that all potential clashes are removed and the operation of the public highway remains at a manageable risk level.

Creating Temporary Accesses

The majority of the individual site accesses will be agreed with the appropriate landowner or stakeholder and Road Service through the consultation phase of the design. All necessary arrangements will be approved well in advance and included within the Stage 1 CTMP for development by the contractor and follow up agreement with Road Service, prior to commencement of the works. These will include:

- a. Exact location and layout of each access;
- b. The duration the access will be kept open;
- c. The nature and extent of traffic using the access;
- d. The construction make-up of the proposed access;
- e. Details of any temporary traffic control measures;
- f. Details for reinstatement of any openings on completion of the works.

Immediately following appointment, the contractor will follow the requirements of the Stage 1 CTMP to ensure that their proposed methodology is coordinated and aligned with Road Service's understanding of the works. The contractor will consult and liaise with Roads Service in order to obtain the necessary approvals and licenses required prior to commencement of any works and in advance of making any opening for access to or egress from the existing public highway.





Produced by Northern Ireland Electricity Limited
www.nie.co.uk

April 2013

Northern Ireland Electricity Limited, Registered Office, 120 Malone Road, Belfast BT9 5HT
Registered in N. Ireland NI 26041

Cover Graphics - MW Design

Print Management - Banner Managed Communication

Printed by - Ream Limited, Belfast