

A Planning Application by
ASHFIELD LAND LIMITED

In respect of
Rail Central

DRAFT Framework Construction Traffic Management Plan

February 2018



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- A RPS report 'Construction Materials Assessment Report'

1 INTRODUCTION

- 1.1 This Construction Traffic Management Plan (CTMP) has been prepared by Transport Planning Associates (TPA) on behalf of Ashfield Land Limited. It addresses the transport issues associated with the construction of a proposed Strategic Rail Freight Interchange (SRFI), known as Rail Central. It has been produced further to a detailed site visit and will be implemented by the appointed contractor(s) in due course.
- 1.2 The SRFI comprises up to 687,483sq.m (7.4M sq.ft) Gross Internal Area (GIA) of high bay warehousing with ancillary offices.
- 1.3 The site currently comprises undeveloped land located to the immediate south of Milton Malsor and Northampton with the proposed access from Northampton Road. The site is considered to be optimally located next to rail and trunk road infrastructure. It is located to the north of the West Coast Main Line (railway line), to the west of the Northampton Loop (railway line) and to the east of the A43 trunk road. The M1 Motorway is located approximately two kilometres to the north.
- 1.4 This CTMP sets out the strategy for the following;
- (i) vehicle routing;
 - (ii) site access;
 - (iii) vehicles and vehicle frequency;
 - (iv) hours of construction; and
 - (v) potential mitigation measures.
- 1.5 It will be the responsibility of the appointed contractor(s) to comply with all statutory regulations and guidelines as appropriate, in relation to construction and movement activities.
- 1.6 All residents of Milton Malsor and Blisworth will be provided with contact details of the contractor, which will also be provided on a board at the entrance to the site.
- 1.7 The Site Manager/s details will be provided to Northamptonshire County Council (NCC) and highways England (HE) in due course and before any construction activities commence.

2 DEVELOPMENT PHASING

- 2.1 The development will be constructed over a ten year period commencing in 2019 and completing in 2029, with 129,790 sq.m (GEA) becoming operational in 2021.
- 2.2 The first stage of works will be taking an initial construction access from the A43. This will use the former petrol filling station access point. This will allow the establishment of a construction compound to the east of the access point. Works will then start on the creation of the main construction site access from the A43, which will facilitate the main road based access for the construction phase.
- 2.3 A central haul road will then be created to Northampton Road to allow works on the underpass to begin. Once complete, this will allow access to the eastern area of the site. Construction access will then be taken to the eastern boundary and another construction compound created. This will allow works to begin on creating the rail infrastructure for the intermodal terminal. These initial rail works will allow the use of rail for some construction activity, potentially including bulk deliveries or exports. The first phase of rail works is unlikely to involve the creation of the entire intermodal facility, but will provide direct rail access to the site.

3 VEHICLE ROUTING AND SITE COMPOUND

- 3.1 The designated route for construction traffic will only be provided from the A43, which can be accessed via M1, Junction 15A to the north and via the A5 and M40 J10 to the south. The vehicles associated with the construction will not be permitted to use any other roads or travel through surrounding villages such as Milton Malsor and Blisworth.
- 3.2 The majority of the construction traffic will arrive from the M1 J15A to access the A43, with some accessing via the A43 and the M40 J10 to the south.
- 3.3 The M1 connects London in the south to Leeds in the north and as such, it is considered that the majority of traffic could use this route.
- 3.4 The M40 connects London in the south to Birmingham. It provides an alternative route from Southern England to the West Midlands, to the M1 and the A34.
- 3.5 The A43 is a dual carriageway measuring approximately eight metres in width on each side of the carriageway. The proposed route is subject to the national speed limit. Further to a review, there are no signed height or weight restrictions along the designated construction traffic route. The routes are observed to already be used by Heavy Goods Vehicles (HGVs). As such, the A43 is considered suitable to accommodate the vehicles associated with the construction of the site.
- 3.6 As set out in **Paragraph 4.1**, the site will be accessed in three phases. The routes for each phase is set out below.

Existing Access

- 3.7 Prior to the construction of a temporary access, the existing left-in, left out access arrangement via the A43 will be used during the construction of the temporary access.
- 3.8 Upon departure of the site, vehicles will make a left-hand turn south towards the A43 Towcester bypass / A5, Tove roundabout where they will then either take the fourth exit back towards the M1 to the north or continue south on the A43 and access the M40 at junction 10.
- 3.9 Vehicles will join the M1 at junction 15A and will continue their journey, in a northern or southern direction.

Temporary Access

- 3.10 The temporary construction access via the A43, will be constructed to the north of the existing access. Vehicles will access the site via this during the construction of the Grade Separated Junction (GSJ).

- 3.11 Upon departure of the site, vehicles will make a left-hand turn south towards the A43 Towcester bypass / A5, Tove roundabout where they will then either take the fourth exit back towards the M1 to the north or continue south on the A43 and access the M40 at junction 10.
- 3.12 Vehicles will join the M1 at junction 15A or M40 junction 10 and will continue their journey, in a north or southern direction.

Grade Separated Junction (GSJ) – March 2019 to October 2020

- 3.13 When the GSJ is complete vehicles will utilise this access point and the temporary access will be stopped up.
- 3.14 Upon departure from the site, vehicles will either make a right hand turn and travel north towards junction 15A of the M1 or south towards junction 10 of the M40, where they would continue their journey.
- 3.15 Advisory signs will be provided along the route as shown on **Figure 3.1**, **Figure 3.2** and **Figure 3.3**, with the exact positions to be agreed with Northamptonshire County Council and Highways England officers. The signs are compliant with Chapter 8 of the Traffic Signs Manual, where applicable, and will be in place for the duration of the construction phase at the site.

Site Construction Compound

- 3.16 During the construction phase, there will be a site compound located within the site.
- 3.17 The compound will have a canteen, meeting room, office, toilets, drying room, reception (sign-in), smoking and vaping area, charge station, car / lorry parking and bike storage.
- 3.18 A material storage and diesel refuelling area will also be contained within the site construction compound.

Haul Roads

- 3.19 The construction traffic associated the site will utilise the main access point via A43.
- 3.20 Phase 2 of the development is the construction of the haul road that will serve the underpass onto Northampton Road (old A43) and will take approximately 30 days. This phase is anticipated to commence in September 2019 and be completed in November 2019.
- 3.21 Once the underpass (Phase 3) is complete, phase 4 of the development is the construction of a haul road from the underpass to the rail freight area. This phase will take approximately 40 days and is anticipated to commence in August 2020 and be completed in September 2020.

- 3.22 It is intended to construct the on-site road network as the construction of the site progresses to ensure site movements are made on a bound surface, reducing the propensity of vehicles taking mud on to the adjacent roads.

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4 SITE ACCESS

4.1 The site will be accessed in three phases:

- (i) the existing left-in, left out access arrangement via the A43 during the construction of the temporary access, as shown on **Figure 4.1**;
- (ii) the temporary construction access via the A43, to the north of the existing access, during the construction of the Grade Separated Junction (GSJ), as shown in **Figure 4.2**; and
- (iii) the new GSJ that will serve the SRFI as shown on **Figure 4.3**.

4.2 The construction of the temporary access via the A43 will allow for the proposed GSJ to be constructed in the location of the existing access. This access will be completed during Phase 1 of the development.

4.3 Provision will be made to enable all construction vehicles to enter and exit the site in a forward gear.

Existing Access

4.4 The existing access arrangement via the A43 is shown on **Figure 4.1**. Swept Path Analysis (SPA) demonstrates that a 16.5m long articulated vehicle can negotiate the proposed junction as shown on **Figure 4.4**.

Temporary Access

4.5 The proposed temporary access arrangement via the A43 is shown on **Figure 4.2**. Swept Path Analysis (SPA) demonstrates that a 16.5m long articulated vehicle can negotiate the proposed junction as shown on **Figure 4.5**.

Grade Separated Junction (GSJ)

4.6 The proposed GSJ arrangement is shown on **Figure 4.3**. SPA, shown on **Figure 4.6**, demonstrates that a 16.5m long articulated vehicle can negotiate the proposed junction.

5 VEHICLE TRIP ATTRACTION

- 5.1 The Proposed Development is anticipated to be built out over a ten year period between 2019 and 2029. During this time construction traffic will include the movement of workers associated with the construction of infrastructure and individual plots along with the movement of material in the form of importing or exporting material.

Abnormal Loads

- 5.2 It is anticipated that the maximum size articulated vehicle that will be accessing the site will be the maximum legal 16.5 metres, weighing a maximum of 40 tonnes.
- 5.3 Should the situation arise that an abnormal load should need to access the site, permission will be sought from the relevant local authorities. However it is anticipated that the propensity for this will be low.
- 5.4 An 'abnormal load' is classed as a vehicle that has any of the following:
- (i) Weighs more than 44,000 kilograms;
 - (ii) An axle load of more than 10,000 kilograms for a single non-driving axle and 11,500 kilograms for a single driving axle;
 - (iii) A width of more than 2.9 metres; and
 - (iv) A rigid length of more than 18.65 metres.
- 5.5 In order to determine the likely number of construction vehicle movements associated with the Proposed Development, it is assumed that the Proposed Development will be constructed in 11 phases.
- 5.6 The forecast number of employees and vehicle movements (including cars, LGVs and HGVs) associated with each of the construction phases is shown in **Table 5.1**.

Table 5.1 Forecast Construction Vehicle Movements

Phase	Description	FTE construction employees	Number of vehicles per day (car / LGV)*	Number of construction vehicles per day (HGV)	Total vehicles
1, 2, 3, 4	New A43 junction	79	71	1	72
2	Haul road from A43 to underpass	18	16	27	43
2	Permanent road from A43 to underpass	77	69	27	97
3	Underpass	11	10	27	37
4	Haul road from underpass to rail freight area	48	43	27	70
4	Permanent road from underpass to rail freight area	58	52	27	79
5	Rail freight terminal and maintenance depot	292	263	32	295
5	Express freight cross dock	70	63	5	68
6	Unit 6 & 7	401	361	49	410
7	Unit 10, 12 & 13	341	307	114	421
8	Unit 5	261	235	28	263
9	Units 3 & 4	360	324	54	378
10	Units 8, 9 & 11	482	434	226	660
11	Units 1 & 2	386	347	54	402

*assumes 90 percent travelling by car

- 5.7 **Table 5.1** demonstrates that there could be a maximum of 434 employee vehicles and 226 HGVs accessing the site during Phase 10 of the construction. This equates to a total of 1,320 two-way vehicles movements across the busiest day, 34 percent of which are HGVs. As a robust assessment it is assumed that 10 percent of construction traffic will arrive at the site during the peak hours on any given day, resulting in up to 174 two-way vehicle movements of cars / LGVs and up to 90 two-way HGV movements, in the peaks hours, on the busiest day.
- 5.8 The figures set out in **Table 5.1** are based on RPS report 'Construction Materials Assessment Report' dated June 2016 and contained at **Appendix A**.
- 5.9 A maximum of up to 482 construction workers are anticipated to be on site during the construction period (Phase 10).
- 5.10 There will be a number of construction vehicles that will be used onsite during the construction period, some of which will be driven to site (i.e. tractors and cranes) and others will be brought to site on the back of a low-loader. The movement of HGVs will be strictly managed to ensure that vehicle movement is controlled and kept to a minimum, especially during network peak hours.

- 5.11 The location where staff will travel from is unknown at this stage as it will depend on the appointed contractor. However, it is envisaged that a number of the non-local workforce will stay at local accommodation and be transported to the site by minibuses to minimise the impact on the strategic and local highway network.

Summary

- 5.12 The anticipated number of HGV movements associated with the construction period is set out in **Table 5.1**. There will also be construction workers arriving at the site first thing in the morning and departing in the evening.
- 5.13 The Proposed Development is anticipated to be built out over a ten year period. During this time construction traffic will include the movement of workers associated with the construction activities and the movement of material to and from the site.
- 5.14 At this stage the contractors are yet to be appointed, but upon appointment they will work with the Council to refine the principles set out within this CTMP.
- 5.15 The construction period will include the use of HGVs to bring the equipment onto the site and this will be strictly managed to ensure that vehicle movements are controlled and kept to a minimum. Deliveries to the site shall be reported to the site manager(s) and will be made on the smallest possible vehicles for that particular item of plant or material, to ensure that vehicles can manoeuvre safely.
- 5.16 In addition to HGV movements there will also be movements associated with smaller vehicles such as the collection of skips for waste management, the transport of construction workers and sub-contractors and therefore not considered to be significant.

6 HOURS OF CONSTRUCTION

- 6.1 Subject to agreement with the Local Planning Authority (LPA), construction activities are expected to be permitted between the core hours of 0730 and 1900 on Monday to Friday and 0800 to 1300 on Saturdays. Deliveries will only take place within these core hours, but avoiding the typical network peak hours of 0800-0900 and 1700-1800, and no working shall take place on Sundays or Public Holidays.
- 6.2 To maximise productivity within the core hours, contractors will be required to be onsite up to 30 minutes before and after core working hours for start-up and close down of construction activities. This includes but is not limited to movement to place of work, unloading, maintenance and general preparation works. This will not include operation of machinery that is likely to cause any disturbance. These periods are not considered to be an extension of core working hours.
- 6.3 Except in the case of an emergency, any work that is required to be undertaken outside of the core working hours (not including repairs or maintenance) will be agreed with the local authority prior to undertaking the works.
- 6.4 Any proposals to modify the core working hours set out above will be discussed and agreed with the local highway authority.

Alternative Working Hours

- 6.5 Any work requiring possession of major transport infrastructure (e.g. work to cross railways or motorways or major roads) may be undertaken outside of the core working hours for reasons of safety or operational necessity. Activities outside of the core working hours that could cause a disturbance will be kept to a practical minimum.
- 6.6 Certain construction activities will require extended working hours for reasons of engineering practicability, such activities could include (but not limited to) netting over railways, major concrete pours and underground cable installation.
- 6.7 Surveys (e.g. for wildlife or engineering purposes) may also need to be carried out outside of the core working hours.

7 POTENTIAL MITIGATION MEASURES

7.1 The construction company(s) will introduce measures to minimise the impact resulting from construction activities.

7.2 Measures will include:

- during the construction phase/s, there will be a construction compound located within the site. Car parking for construction workers will be provided within the site compound. No parking will be permitted on Northampton Road or local residential streets at any time during the construction phase and restrictions will be in place to prevent this;
- signs to direct construction vehicles associated with the development will be erected along the route. Drivers will be provided with a route plan in advance of delivering to site to ensure that vehicles follow the proposed routes;
- wheel-washing facilities to be provided inside the main site access point so that no construction vehicles exiting the site compounds will take mud or debris onto the highway network, should conditions dictate;
- a requirement for engines to be switched off on-site when not in use;
- spraying of areas with water as and when conditions dictate;
- a road sweeper to be made available whenever operations dictate;
- vehicles carrying waste material off-site to be sheeted;
- turning areas will be provided to ensure vehicles can exit the site in a forward gear;
- the use of the railway, where possible;
- road closures outside of peak hours; and
- registration and compliance with the Considerate Constructors Scheme (CCS). The Code of Considerate Practice commits the sites that register (along with suppliers) to care about the appearance, respect the local community, protect the environment, ensure everyone who is on site's safety and value the workforce.

7.3 During the site preparation, appropriate security fencing will be erected in order to maintain proper site security and safety within the construction areas. The fencing will be maintained throughout the construction of the works to ensure the safety of construction workers and visitors.

Information Packs and Communications

- 7.4 Information packs will be provided to all contractors working on site during the construction phase. These packs will form part of the contractual agreement between the contractors and the National Grid.
- 7.5 The information packs will contain the following information / requirements:
- (i) Risk Analysis Management Systems (RAMS) guidance;
 - (ii) any HGV restrictions;
 - (iii) construction traffic routes;
 - (iv) a Delivery Management System (DMS);
 - (v) non-compliance guidance;
 - (vi) complaints procedure;
 - (vii) CTMP protocol for all contractors, including a Code of Conduct / Good Practice;
 - (viii) guidance on the standard communication procedures whilst on site; and
 - (ix) CTMP contacts, both emergency and non-emergency.

Mud pollution to Surface Water

- 7.6 Silt that enters the surface water system through road gully pots is considered to be a potential hazard.
- 7.7 A double sheet of teram in the road gully grating should be provided as this would catch the silt but allow the water to permeate. The gullies will require regular upkeep.

Mud on the Highway

- 7.8 The roads and sewers for the development will be installed in the early phases of the development in order to keep the amount of mud overspill on to the highway network to a minimum.
- 7.9 During the earth removal operations, a road sweeper to be made available on site to ensure the surrounding highways are kept clean.
- 7.10 Wheel-washing facilities to be provided inside the main site access point so that no construction vehicles exiting the site compounds will take mud or debris onto the highway network by vehicles.

Measures to control emissions of Dust and Dirt

- 7.11 A mechanical road sweeper will be on site to remove any build-up of dirt on the site and surrounding highway.
- 7.12 All of the hard-standing will be in place at an early stage of the build to minimise mud overspill.

- 7.13 All construction traffic will follow specifically designed routes; speed limits will also be put in place on site for all vehicular movements.
- 7.14 Ongoing monitoring will be undertaken by the site Manager will monitor the condition of the roads and as and when necessary will carry out various works to control the issue, these include:
- hand scraping isolated areas of the highway;
 - mechanical scraping of the roads;
 - damping down the road with the onsite forklift fitted with the water filled sweeper attachment;
 - a road sweeper being available on site; and
 - spoil heaps will be monitored, sealed and if necessary covered or damped down to avoid wind whipping.

Management of Deliveries

- 7.15 The phone number of the site manager/s will be made available to all drivers of vehicles that will be accessing the site. The drivers of the HGVs will be required to call ahead, either whilst stopped or using their hands-free devices. Drivers will be advised to stop at the Northampton Service area before they leave the M1 Motorway at Junction 15A. This will allow enough time to prepare for their arrivals at the site access. Similarly, when the HGVs are egressing the site, the driver will notify the site manager.
- 7.16 The following procedure will be initiated when deliveries are made to the site:

Procedure for Arrival to Site

- driver to call ahead to site when they reach M1 Junction 15A services; and
 - the driver will be informed the operators are in place and it is appropriate to travel to the site via the agreed route.
- 7.17 The following procedure will be initiated when HGVs are leaving the site:

Procedure for Leaving the Site

- 7.18 The site manager will be notified before any drivers depart the site.
- 7.19 No traffic regulation orders, footway closures or parking suspensions are required as a result of the construction phase at the site.

Traffic Management Group

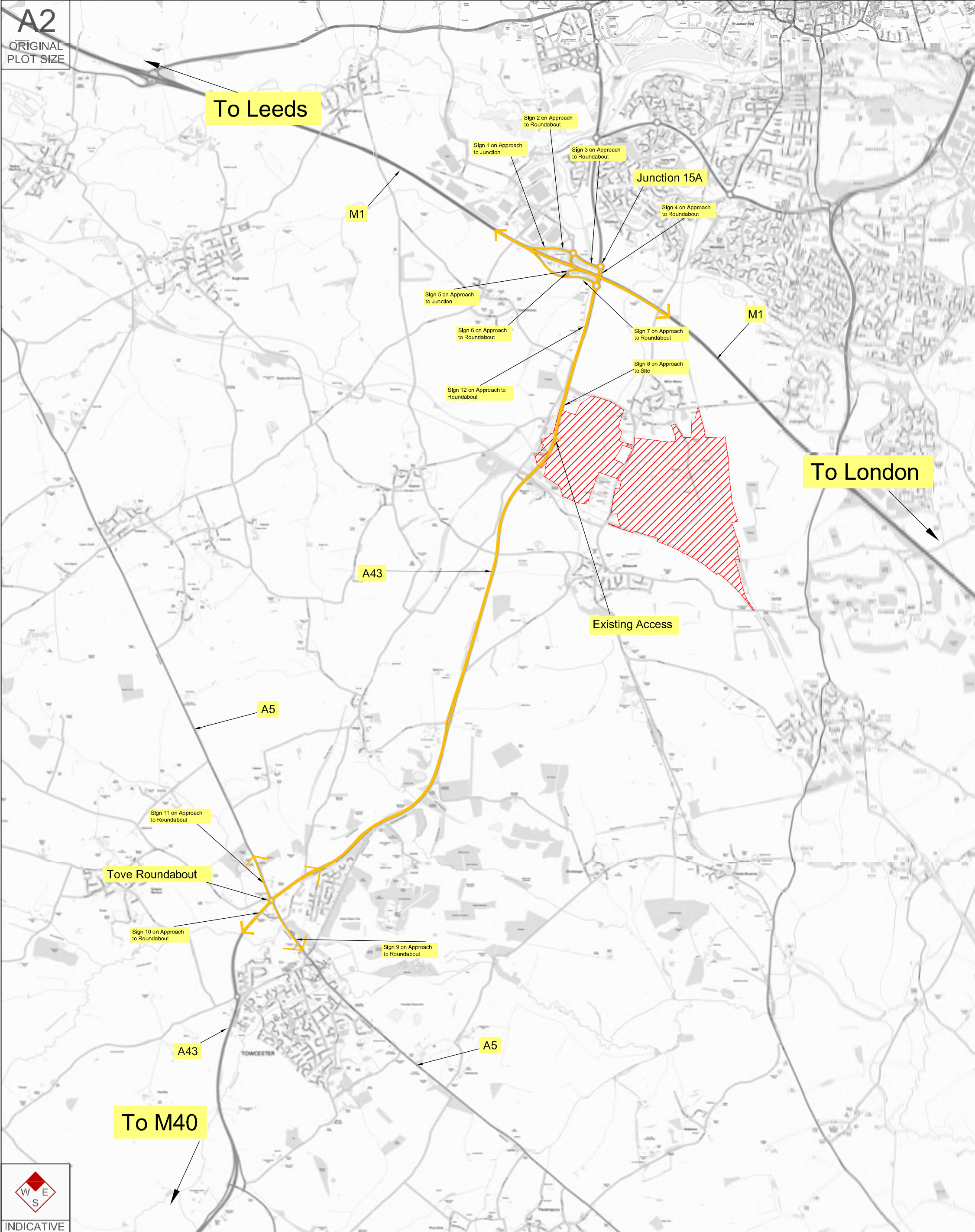
7.20 A Traffic Management Group (TMG) will be set up, prior to construction. A Transport Coordination Officer (TCO) will also be appointed. The role of the TMG will be as follows:

- (i) to implement and monitor the CTMP;
- (ii) discuss and review the traffic and transportation elements of the construction phase/s, meetings will be scheduled twice a year unless there are specific issues that are brought to the attention of the TCO and required further discussions;
- (iii) review the implementation and effectiveness of the mitigation measures, as set out in this chapter;
- (iv) discuss the contractor obligations set out within the CTMP; and
- (v) update the CTMP based on the success of the mitigation measures.

7.21 The TMG will comprise representatives from the following organisations;

- (i) National Grid;
- (ii) Highways England;
- (iii) Northamptonshire County Council;
- (iv) Corby Borough Council;
- (v) Daventry District Council;
- (vi) East Northamptonshire Council;
- (vii) Kettering Borough Council;
- (viii) South Northamptonshire Council; and
- (ix) Borough Council of Wellingborough.

FIGURES



- Sign 1
- Rail Central construction traffic
- Sign 2
- Rail Central construction traffic
- Sign 3
- Rail Central construction traffic
- Sign 4
- Rail Central construction traffic
- Sign 5
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- Sign 11
- Rail Central construction traffic
- Sign 12
- Rail Central construction traffic

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KEY

- Approximate Site Boundary
- Construction Traffic Road

A	28.02.18	Client details updated.	PSW	AJS	MB
Rev	Date	Details	Drawn by	Checked by	Approved by

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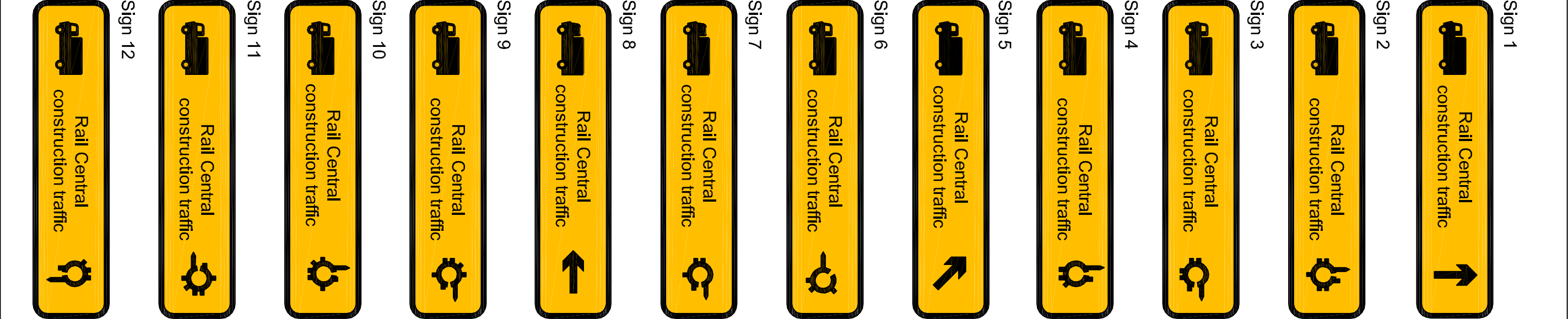
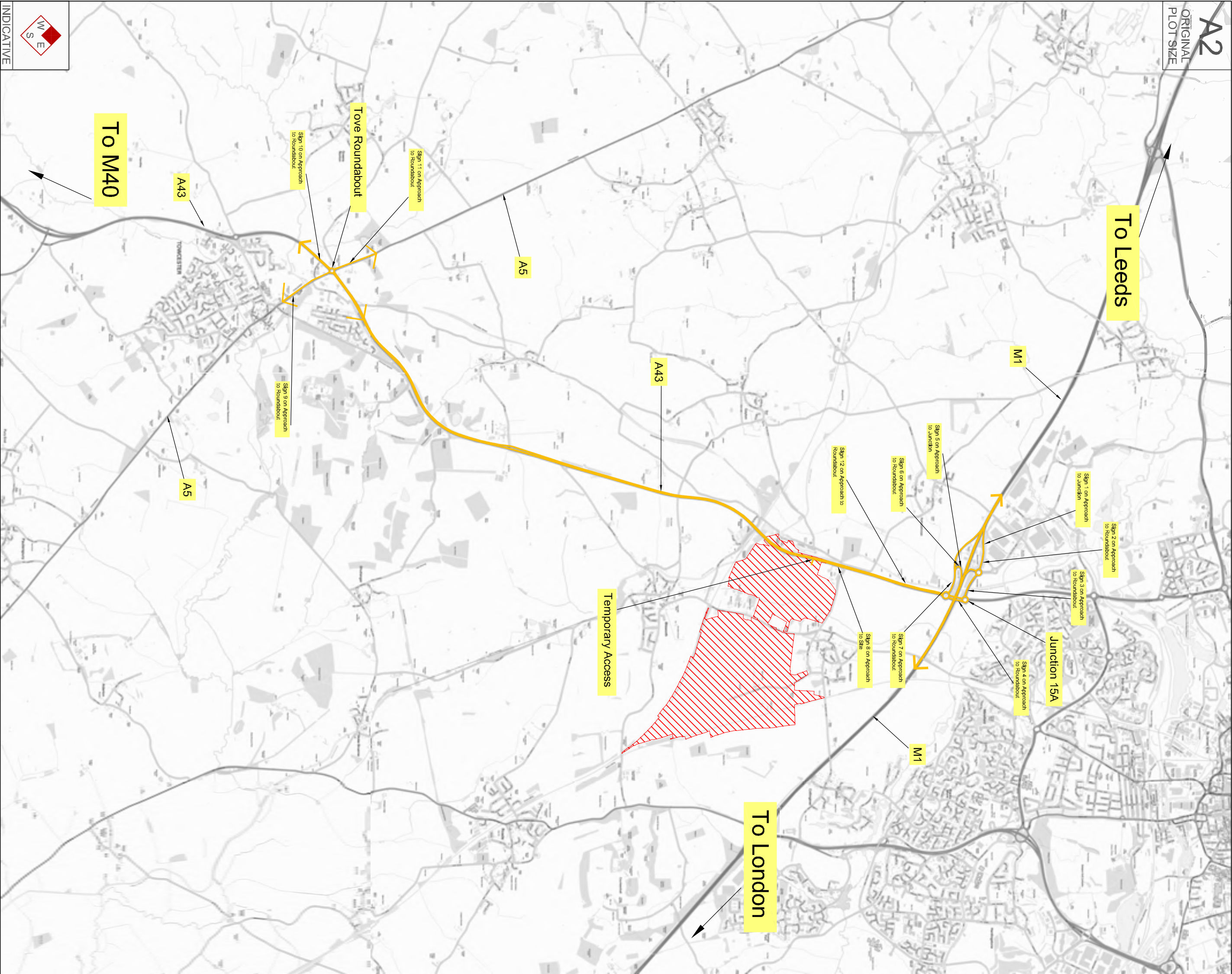
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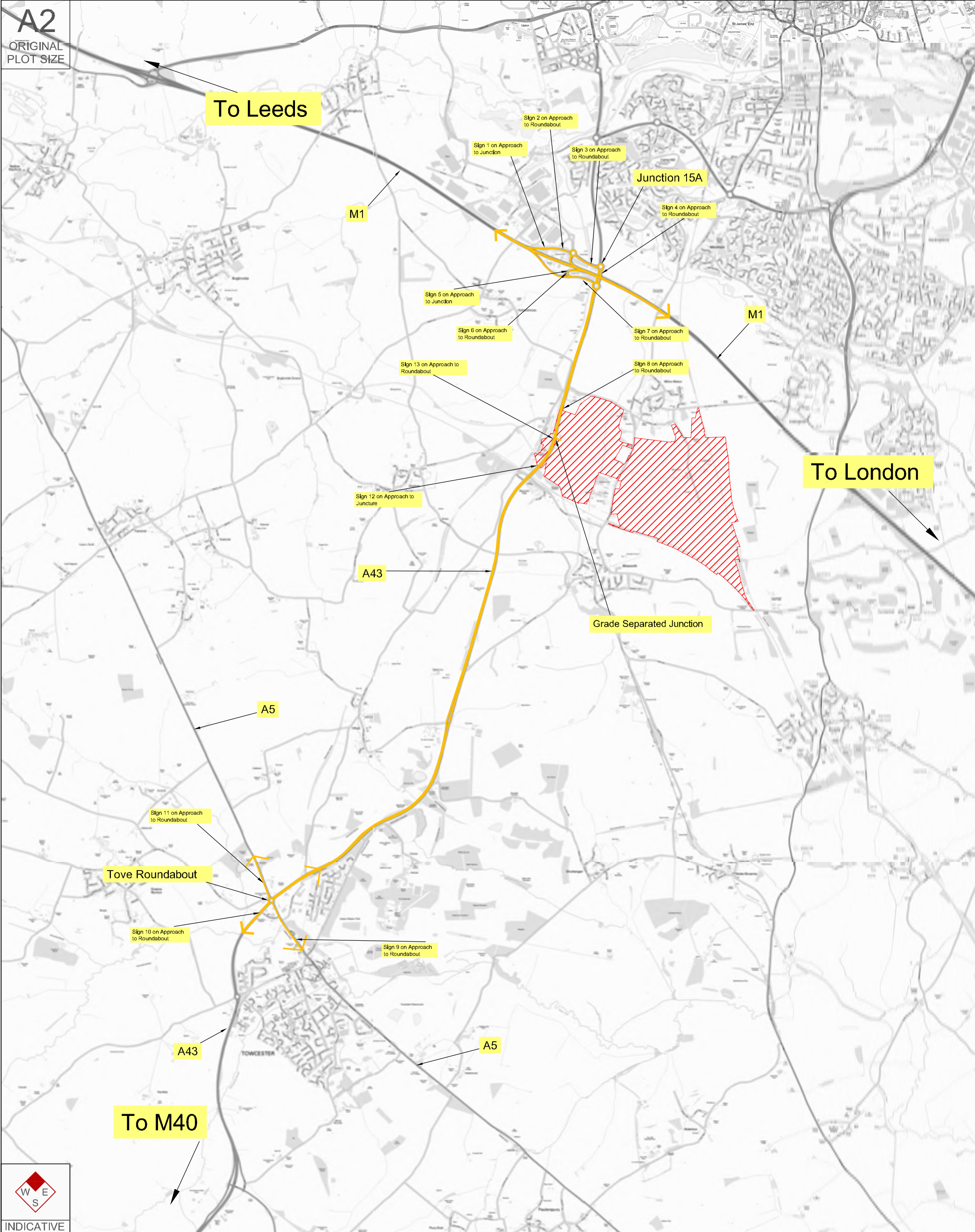
Rail Central

TITLE:
Construction Route Plan -
Existing Access

STATUS:
INFORMATION

SCALE: 1:40,000	DATE: 05/07/17	DRAWN: DR	CHECKED: SB	APPROVED: MB
JOB NO: 1211-80	DRAWING NO: Figure 3.1	REVISION: A		





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KEY

- Approximate Site Boundary
- Construction Traffic Road

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A	28.02.18	Client details updated.	PSW	AJS	MB

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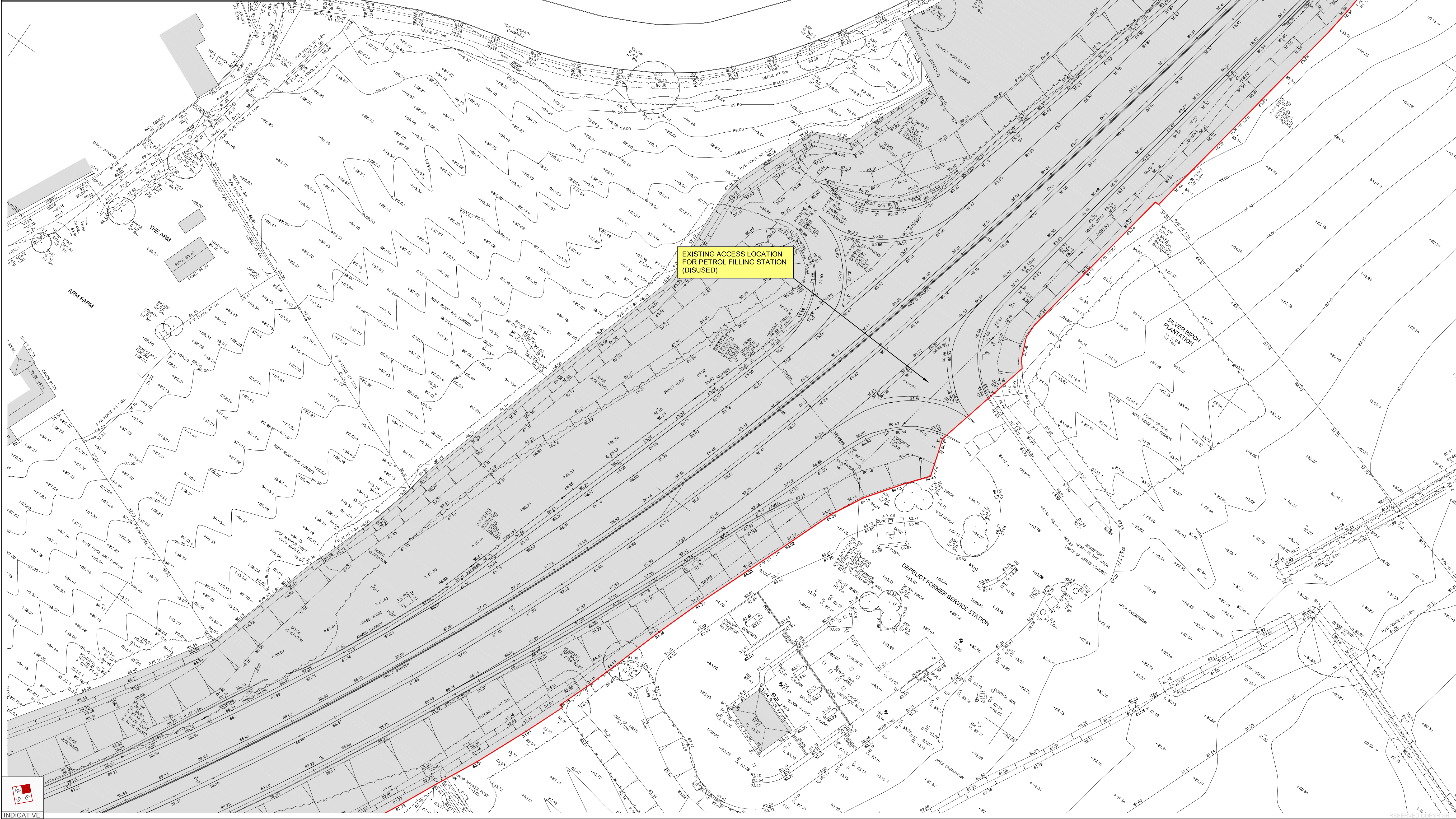
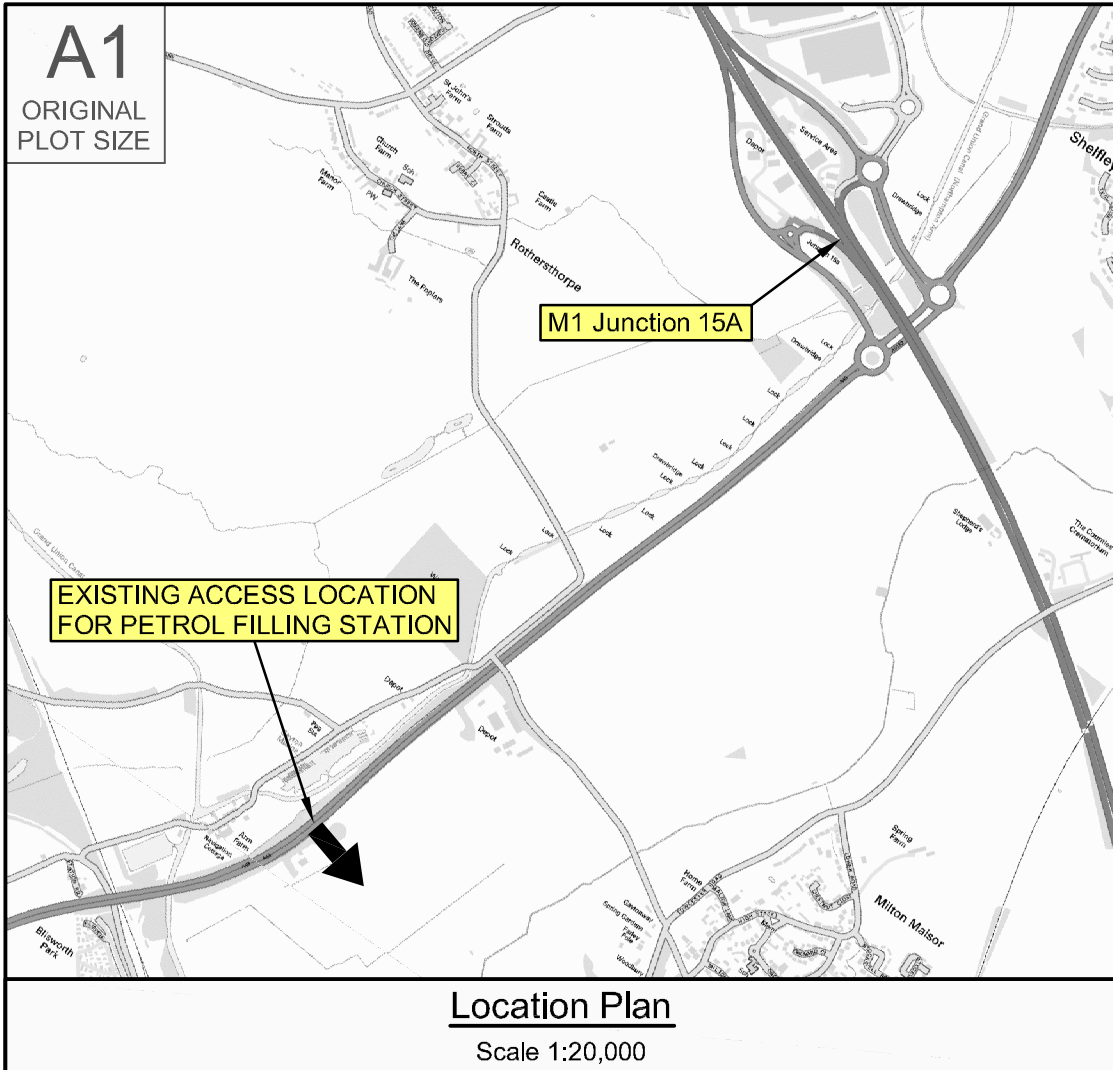
TITLE:
Construction Route Plan -
Grade Separated Junction

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INFORMATION

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1211-80	Figure 3.3	A

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NOTES:

1. The extent of adopted highway has been taken from an unscaled Ordnance Survey based 'indicative maintenance boundary' for Area 7 (A43 sheet 10 of 11) received from Highways England in July 2015. The adopted highway has been matched to surveyed topographical features where possible and is indicative only.

KEY

- Approximate red line boundary
- Approximate extent of adopted highway maintainable at public expense by Highways England

A		Client details updated:		PSW	AJS	MB
Rev	Date	Drawn	Checked	By	By	By
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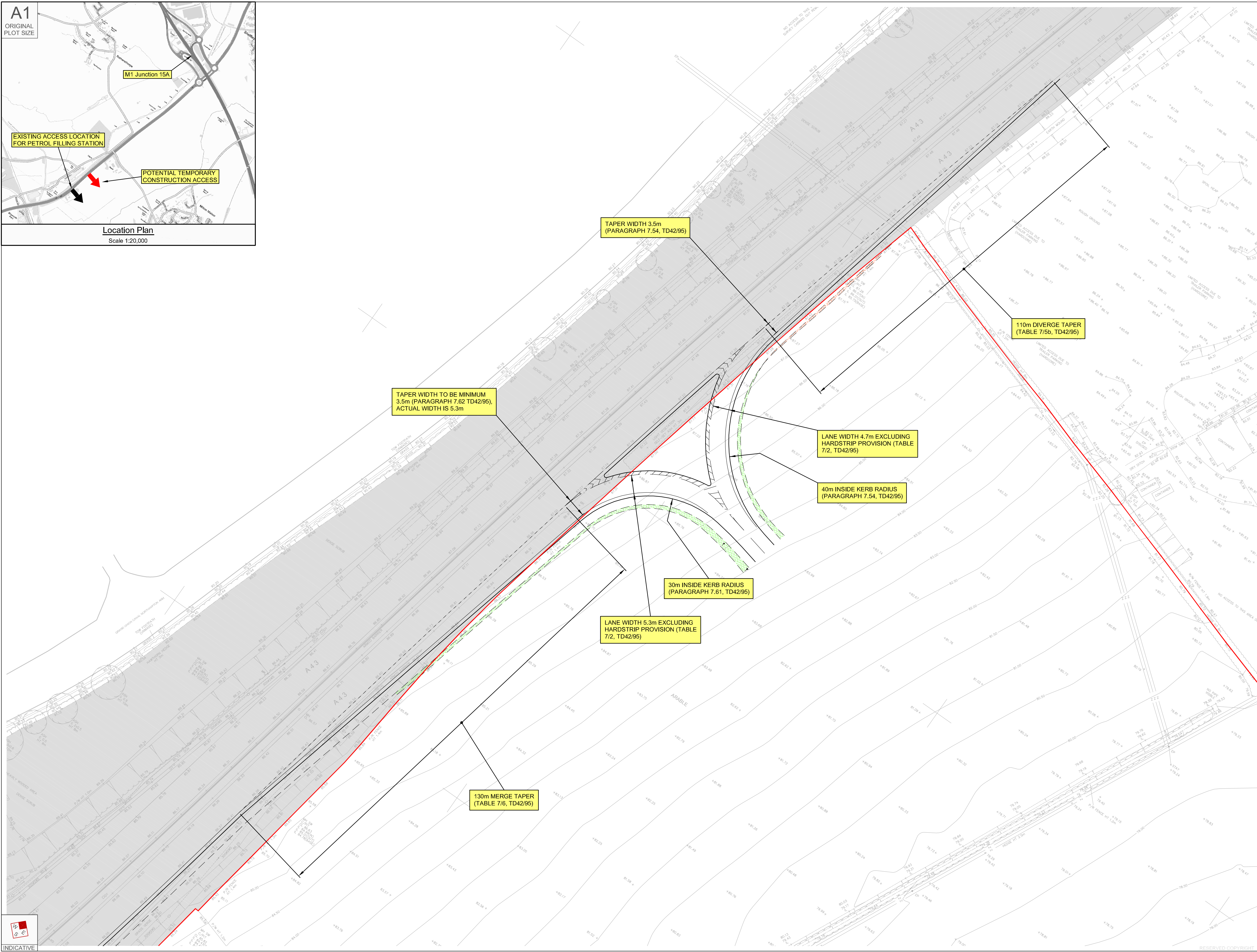
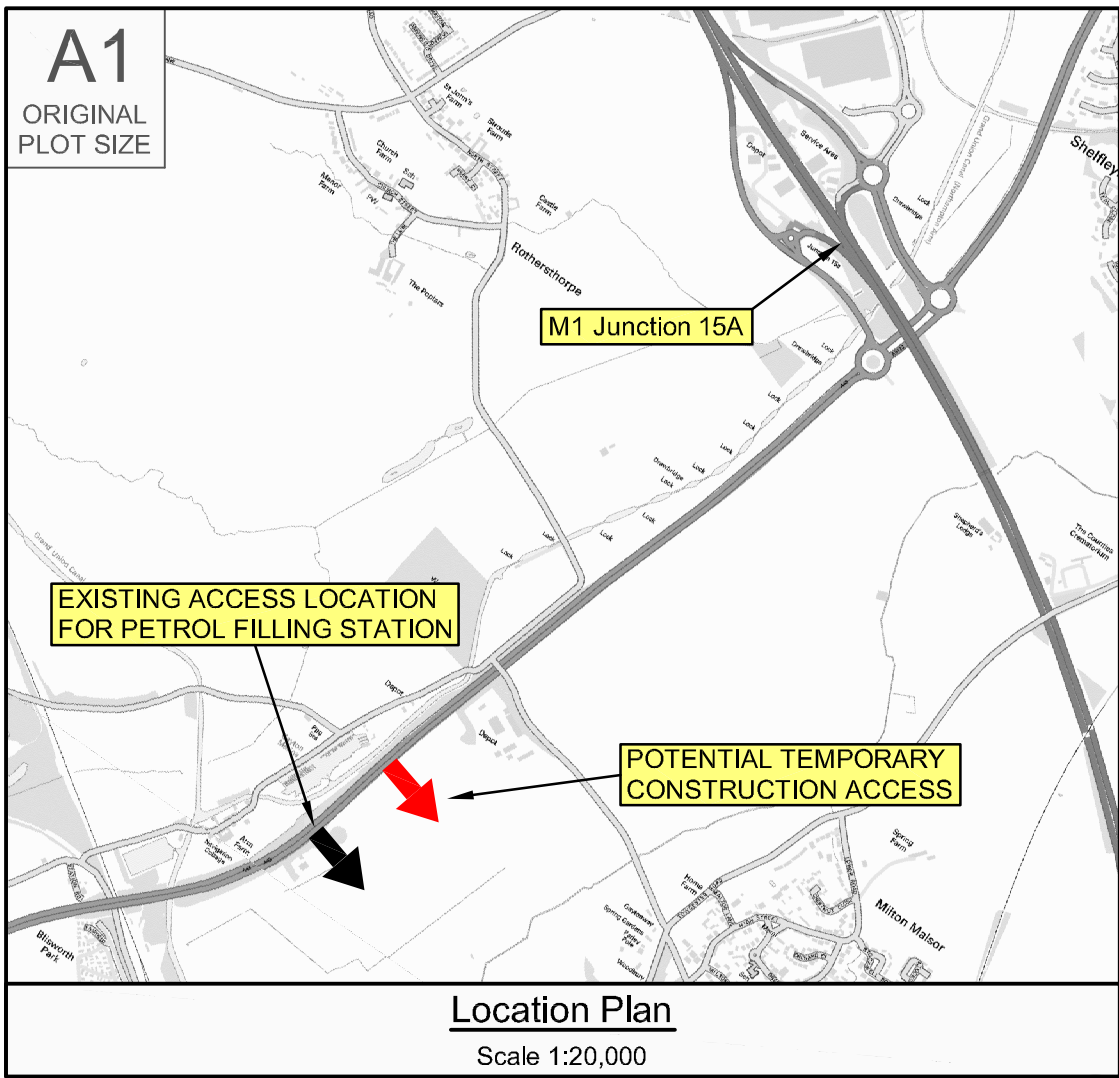
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TITLE:
Existing Access Arrangement

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1211-80	Figure 4.1	A



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NOTES:

- The extent of adopted highway has been taken from an unscaled Ordnance Survey based 'indicative maintenance boundary' for Area 7 (A43 sheet 10 of 11) received from Highways England in July 2015. The adopted highway has been matched to surveyed topographical features where possible and is indicative only.
- The extent of earthworks shown are preliminary and indicative only.

KEY

- Approximate red line boundary
- Approximate extent of adopted highway maintainable at public expense by Highways England
- Indicative fill
- Indicative cut

Rev	Date	Drawn By	Checked By	Approved By
A	20.02.18	PSW	AJS	MB

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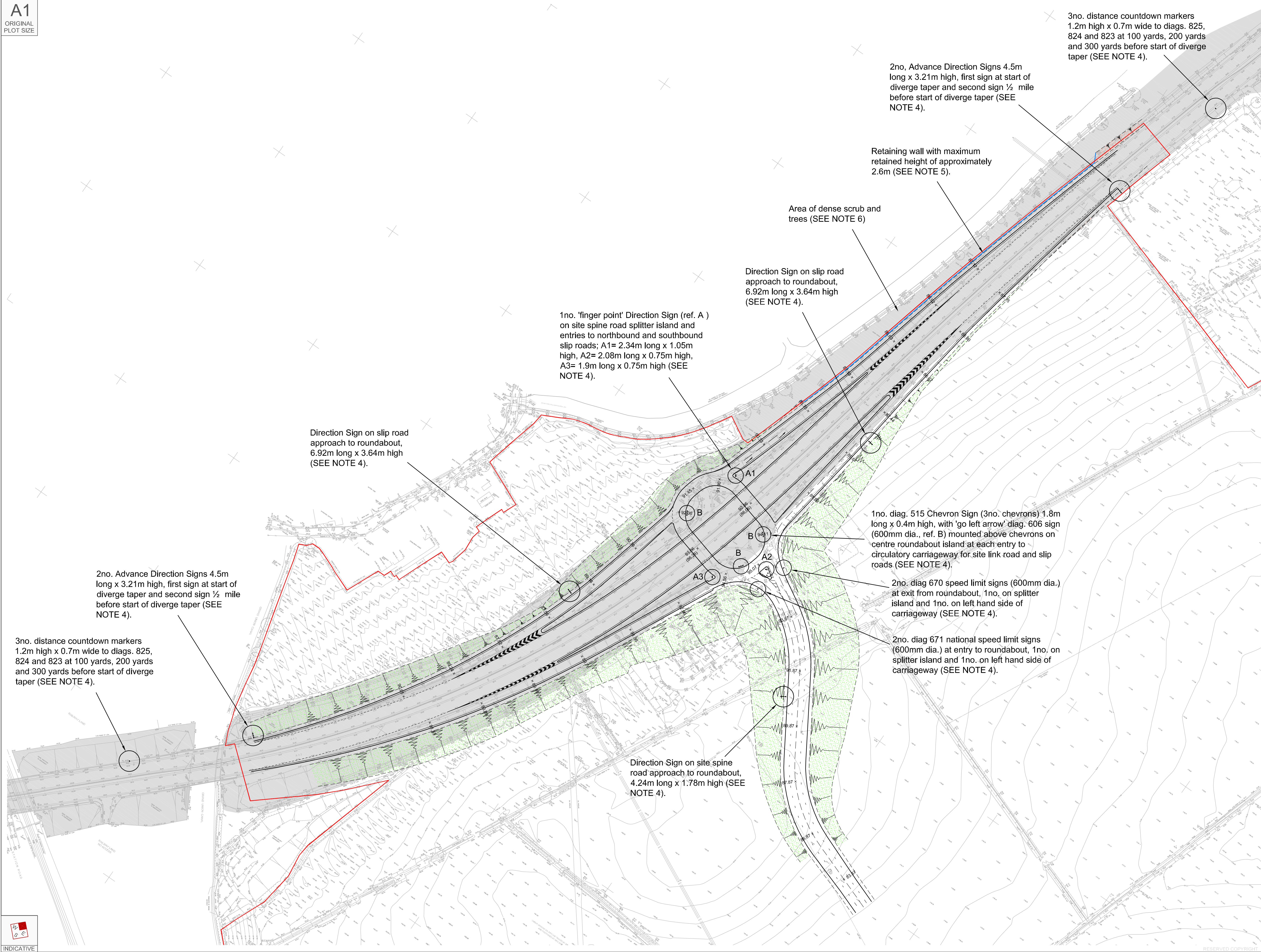
PROJECT:
Rail Central
Northamptonshire

TITLE:
**Temporary Construction
Access Arrangement**

STATUS:
INFORMATION

SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:500	03.07.17	PSW	KSS	MB

JOB NO:	DRAWING NO:	REVISION:
1211-80	Figure 4.2	A



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NOTES:

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2. The earthworks shown are preliminary and indicative only.
3. The exact size and location of signs will be subject to a detailed design and agreement with highway officers.
4. The mounting heights for signs is 1.5m to the underside of the sign above the surface level of the adjacent carriageway.
5. The extent and retained height of retaining wall shown is indicative only and will be subject to a detailed design.
6. The earthworks in this location have been worked out assuming that the ground falls at a constant gradient between the levels on each side of this area, as detailed topographical information is not available.
7. The extent of adopted highway has been taken from an unscaled Ordnance Survey based 'indicative maintenance boundary' plan for Area 7 (A43 sheet 10 of 11) received from Highways England in July 2015. The adopted highway has been matched to surveyed topographical features where possible and is indicative only.

KEY

- Approximate redline boundary
- Indicative fill
- Indicative cut
- Indicative retaining wall
- Indicative area of adopted highway maintainable at public expense by Highways England

Rev	Date	Details	Drawn	Checked	Approved
A	28.02.18	Client details updated.	PSW	AJS	MB

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Bristol
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0117 925 9400
www.tpa.uk.com

CLIENT:
ASHFIELD LAND MANAGEMENT LIMITED
AND GAZELEY GLP NORTHAMPTON s.à.r.l.

PROJECT:
Rail Central
Northampton

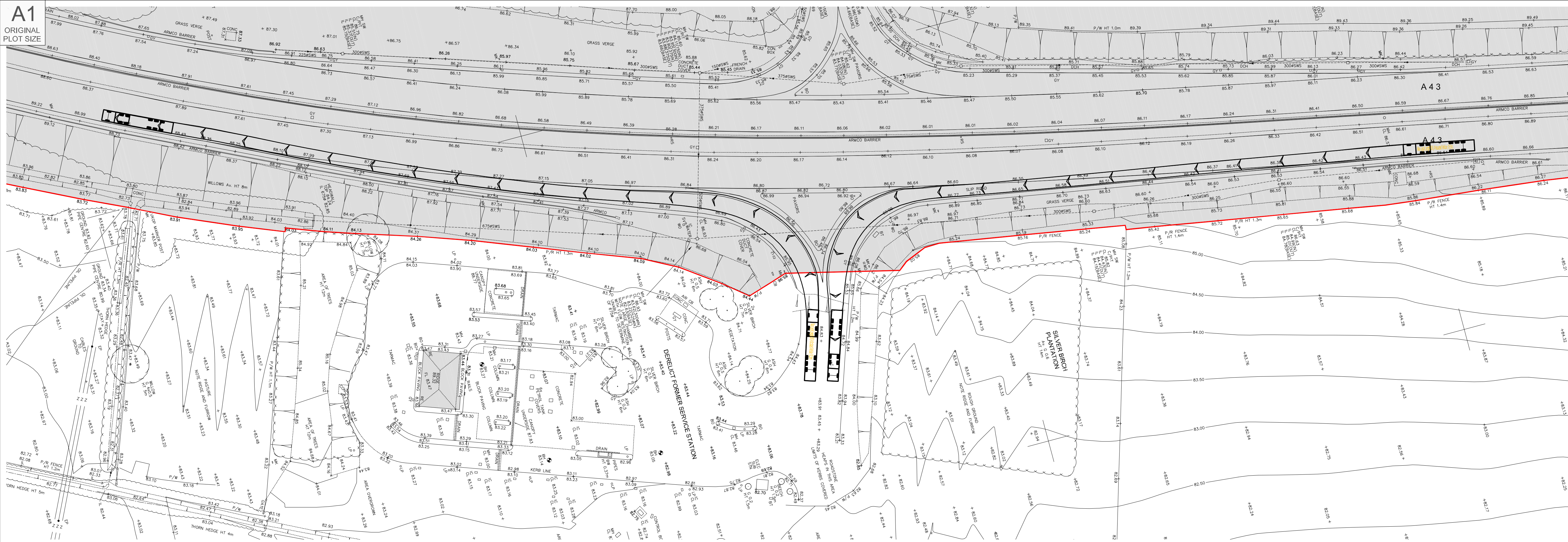
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Arrangement**

STATUS:
INFORMATION

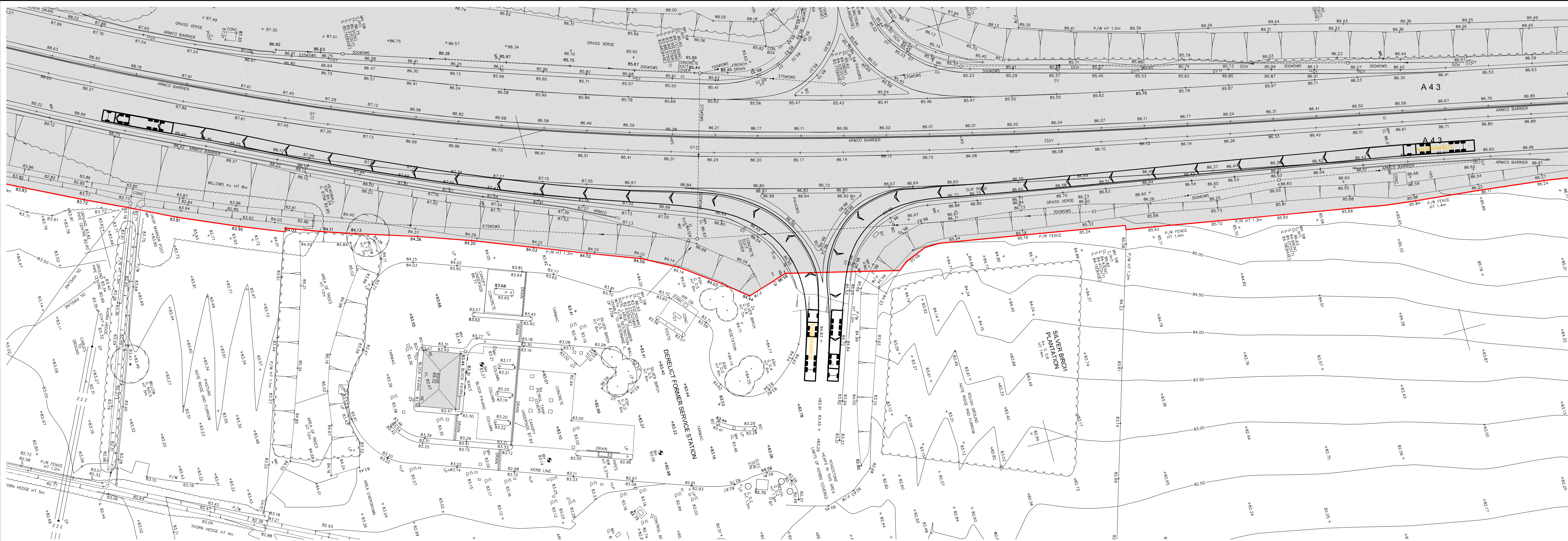
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JOB NO:	DRAWING NO:	REVISION:
1211-80	Figure 4.3	A

A1
ORIGINAL
PLOT SIZE



Swept Path Assessment Of A 16.5m Long Articulated HGV



Swept Path Assessment Of A 400t Mobile Crane

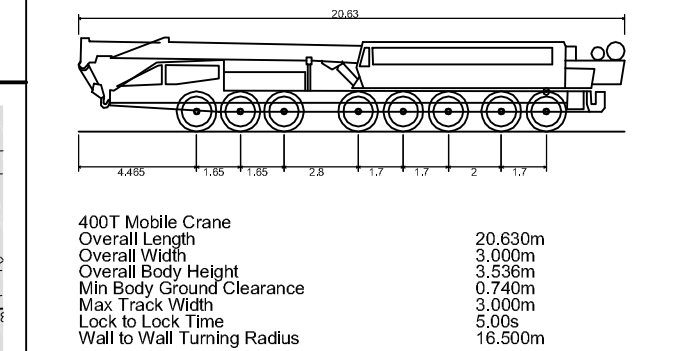
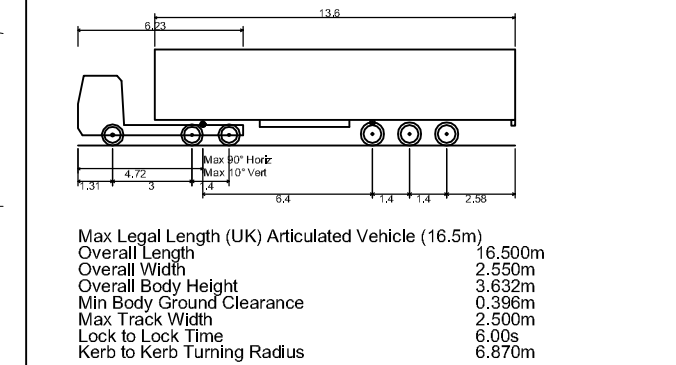
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NOTES:

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KEY

- Approximate red line boundary
- Approximate extent of adopted highway maintainable at public expense by Highways England



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ASHFIELD LAND MANAGEMENT LIMITED
AND GAZELEY GLP NORTHAMPTON s.à.r.l.

PROJECT:
Rail Central

TITLE:
Existing Access Arrangement
Swept Path Assessment

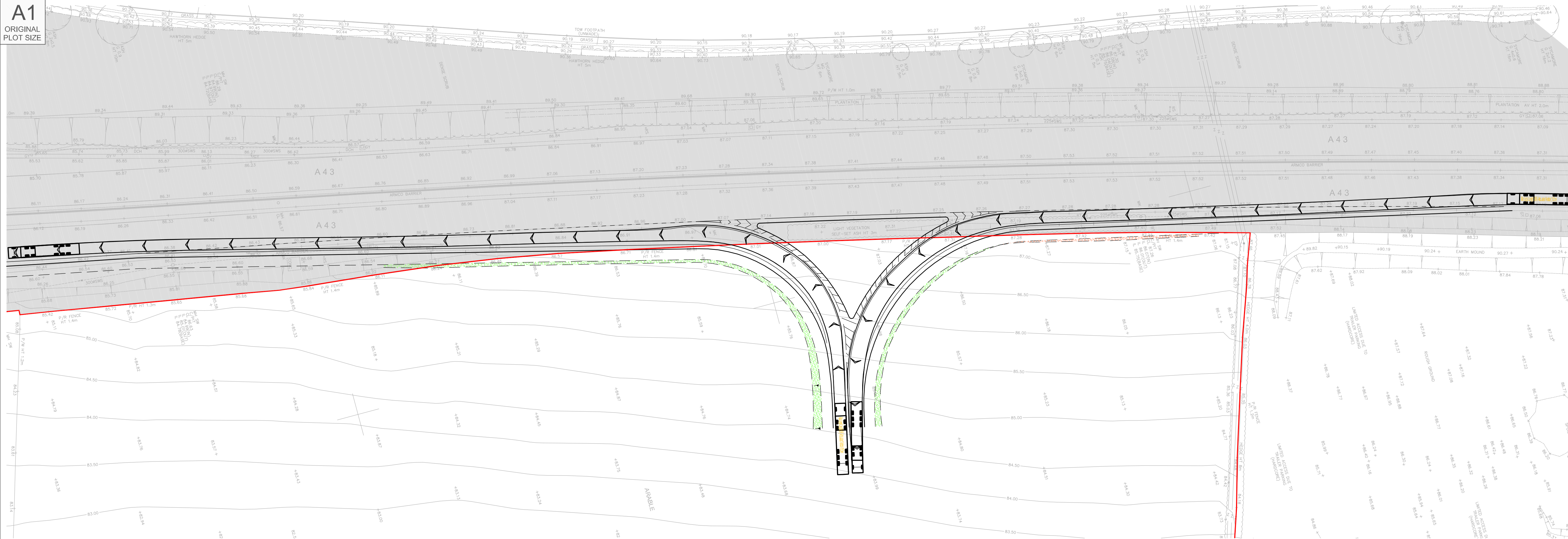
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INFORMATION

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1211-80	Figure 4.4	A		

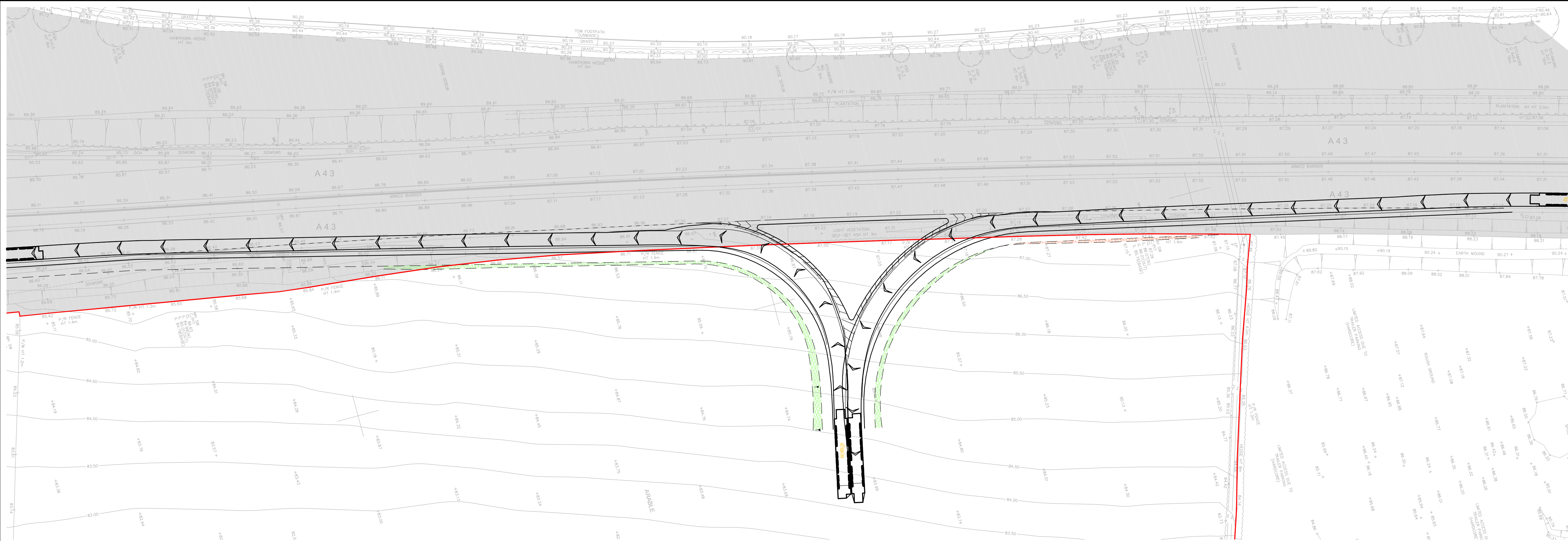


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A1
ORIGINAL
PLOT SIZE



Swept Path Assessment Of A 16.5m Long Articulated HGV



Swept Path Assessment Of A 400t Mobile Crane

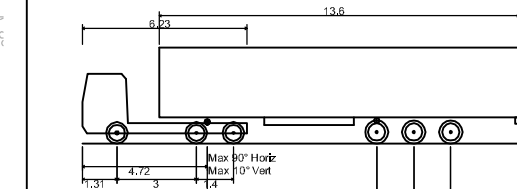
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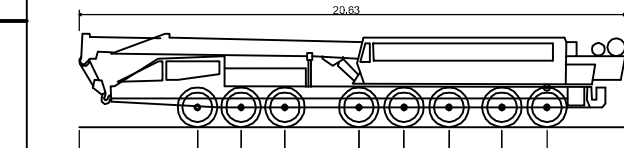
1. The extent of adopted highway has been taken from an unscaled Ordnance Survey based 'indicative maintenance boundary' for Area 7 (A43 sheet 10 of 11) received from Highways England in July 2015. The adopted highway has been matched to surveyed topographical features where possible and is indicative only.
2. The extent of earthworks shown are preliminary and indicative only.

KEY

- Approximate red line boundary
- Approximate extent of adopted highway maintainable at public expense by Highways England
- Indicative fill
- Indicative cut



Max Legal Length (UK) Articulated Vehicle (16.5m)
Overall Length 16.500m
Overall Width 2.550m
Overall Body Height 3.630m
Min Body Ground Clearance 0.366m
Max Track Width 2.500m
Lock to Lock Time 6.00s
Kerb to Kerb Turning Radius 6.670m



400t Mobile Crane
Overall Length 20.630m
Overall Width 3.000m
Overall Body Height 3.330m
Min Body Ground Clearance 0.740m
Max Track Width 3.000m
Lock to Lock Time 5.00s
Wall to Wall Turning Radius 16.500m

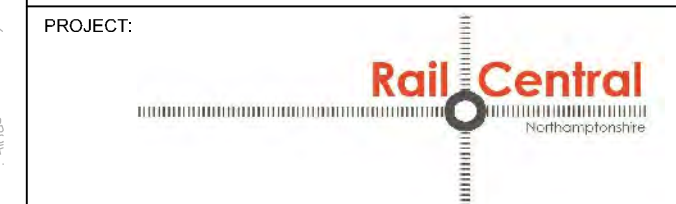
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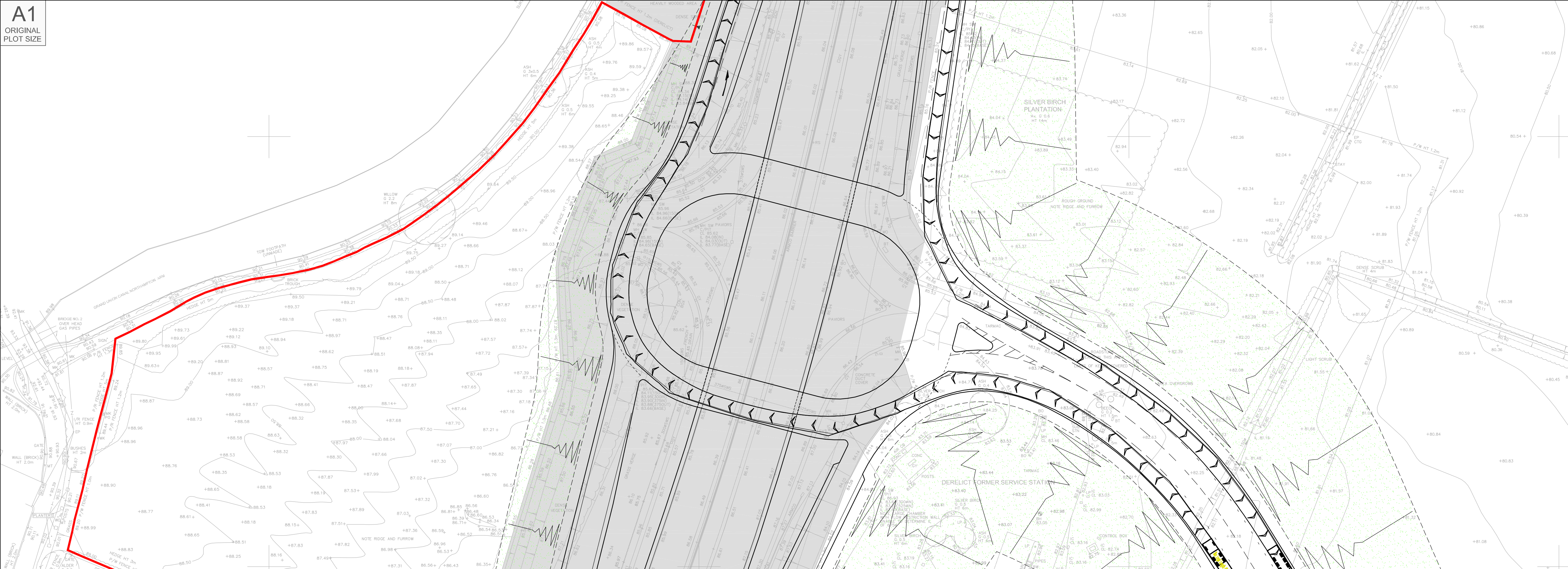
TITLE:
Temporary Construction
Access Arrangement - Swept
Path Assessment

STATUS:
INFORMATION

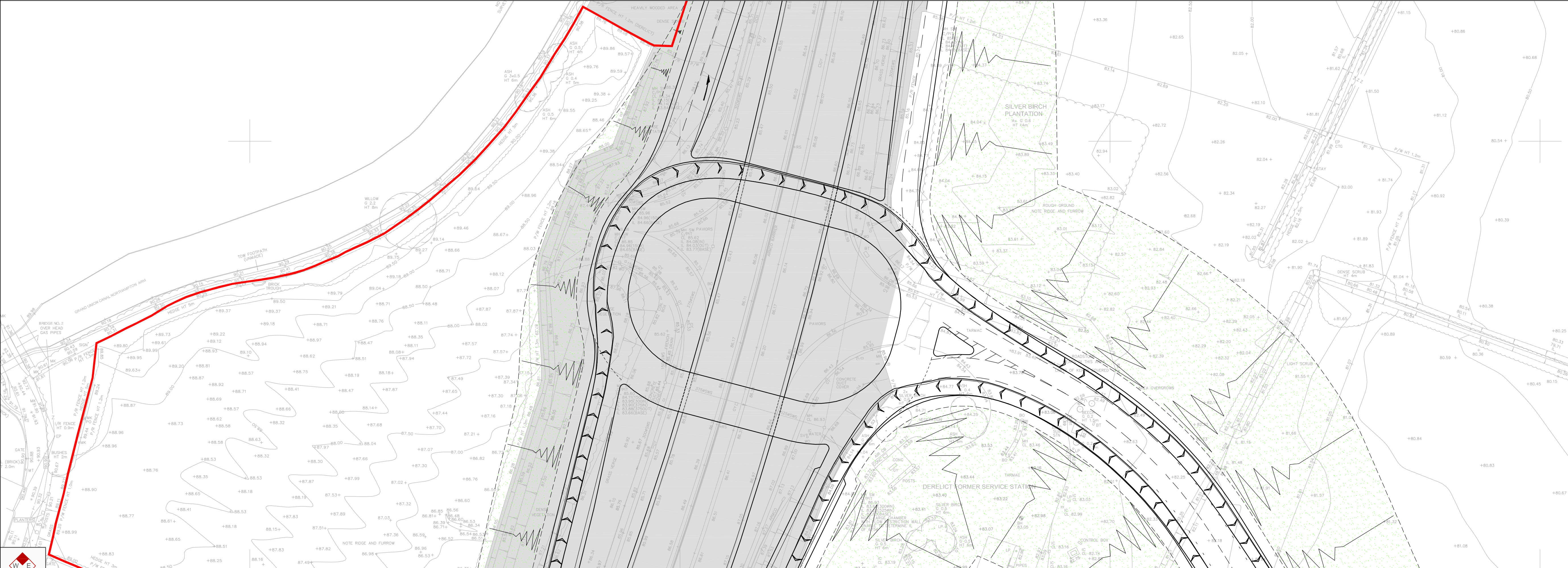
SCALE: 1:500	DATE: 03.07.17	DRAWN: PSW	CHECKED: KSS	APPROVED: MB
JOB NO: 1211-80	DRAWING NO: Figure 4.5	REVISION: A		



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Construction Vehicle Approaching / Leaving from North



Construction Vehicle Approaching / Leaving from South

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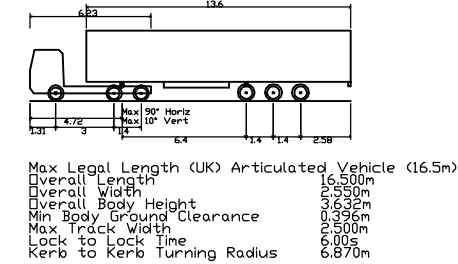
NOTES:

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- Indicative retaining wall
- Indicative area of adopted highway maintainable at public expense by Highways England



A		20/02/16	Client details updated.	PSW	AJS	MB
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CLIENT: ASHFIELD LAND MANAGEMENT LIMITED AND GAZELEY GLP NORTHAMPTON s.ä.r.l.						
PROJECT: Rail Central Northampton						
TITLE: Swept Path Analysis of 16.5m Vehicle Negotiating Proposed Grade Separated Access						
STATUS: INFORMATION						
SCALE: 1:500		DATE: 04.07.17		DRAWN: DR		CHECKED: KSS
JOB NO: 1211-80		DRAWING NO: Figure 4.6		APPROVED: MB		
				REVISION: A		

APPENDIX A

Title: Construction Materials Assessment Report

Project: NK018318 – Ashfield Land
Rail Central

QUALITY MANAGEMENT

Prepared by:	Amir Alrikaby
Authorised by:	John Clayton
Date:	02 June 2016
Project Number/ Document Reference:	NK018318 – RPS-00-XX-RP-C-002

Revision History

Rev.	Date	Description	Author	Checked

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2 MATERIAL QUANTITIES ASSUMPTIONS..... 5

3 MATERIAL USAGE..... 7

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APPENDICES:

- Michael Sparks Associates, Illustrative Masterplan, 30708-FE-43
- RPS, Construction Traffic Assessment Key Plan, RPS-00-XX-DR-C-SK0007
- Material Calculations Spreadsheets

1 INTRODUCTION

1.1 Site Location

The Rail Central site lies approximately 5 miles south of Northampton town centre (National grid Reference 473077, 254830) and covers an area of approximately 260ha. Directly to the north of the site is the village of Milton Malsor, to the western boundary is the A43, to the east the Northampton loop rail line and to the south the west coast mainline. The Northampton / Towcester Road runs directly through the site from north to south. Further to the east of the site is the M1 motorway junction 15.

1.2 Project Description

The development outlined on Michael Sparks Associates drawing ref 30708-FE-43 consists of approximately 7.3M sqft of industrial warehousing with ancillary office accommodation and lorry park. A rail freight terminal and train maintenance facility adjacent to the Northampton loop line and express freight platform adjacent to the west coast mainline. To facilitate access for the development, a new grade separated junction on the A43 and site access road will be constructed.

1.4 Scope

The main purpose of this exercise is to assess the number of vehicles delivering construction materials to the site in order to understand the impact of the construction traffic on the operation of the existing highway network. Quantities of construction materials have been estimated for six key aspects as follows:

1. Estate Roads
2. Bridges to form split level highway access on A43 Road
3. Buildings (Zone 1 to Zone 5)
4. Landscaping
5. Intermodal (Zone 6)
6. Express Freight Platform (Zone 7)

2 MATERIAL QUANTITIES ASSUMPTIONS

In order to quantify materials of different aspects of the project, several assumptions have been made to determine volumes/tonnage of construction materials as the following:

2.1 Buildings (Zone1 to Zone5)

- Construction thickness is : 200mm Concrete cast in-situ ground floor slab on top of 250mm unbound granular mixture type-1
- Construction thickness of service yard hardstanding is : 190mm concrete cast in-situ on top of 260mm unbound granular mixture type-1
- Construction thickness of carpark: 25mm surface course, 75mm dense binder course on top of 150mm unbound granular mixture type-1
- Building: 15m clear internal height
- Precast concrete loading docks
- Composite cladding to walls and roof

2.2 Estate Roads

Construction thickness of all estate roads shown on RPS drawing (RPS-00-XX-DR-C-SK0007) as the following:

- Surface Course : 40mm
- Binder Course : 60mm
- Base Course : 250mm
- Foundation (Sub-Base): 420mm

- 2.3 It is assumed that all construction materials will be brought to site via road transport. Depending on the phasing of the development and the timing of the construction of the rail freight terminal, it is possible that some of construction materials could be delivered by rail, for example, aggregates and possibly cement (see 2.5 below)

2.4 Vehicle type

Three types of transporting vehicles have been assumed as shown in the following table:

Vehicle Type		Max Payload (t)
Articulated trailer	A	30
Concrete truck mixer	C	15
Tipper	T	20

2.5 Concrete Works

It is assumed that concrete will be delivered to site via concrete mixer vehicles; however it is possible that an on-site batching plant will be proposed during construction works. This will however still require delivery of aggregate and cement. The traffic impact in terms of road delivery is likely to be reduced, because the aggregate and cement would be delivered by tippers and cement trucks respectively, which in turn they have bigger payload capacities than concrete mixer trucks.

2.6 Earthworks

It is assumed all top soil will be retained on site for Landscaping/ bunding purposes. It is also assumed that all other earthworks will re-use any remaining material, i.e. there will be no net import/export of soil during earthworks exercise.

2.7 list of exclusions

This report currently excludes:

- Contractors Plant/Machinery.
- Car journeys of construction workers
- Zone 8 –Grand Junction (further details required).

3 MATERIAL USAGE

- 3.1 The total weight of the construction materials which will be transported to the rail central site is estimated to be **1.5 million** tonnes during the construction phase.
- 3.2 Table 3.1 illustrates the breakdown of the above tonnages for the key aspects in addition to the transport mode and the assumed payload for each type of materials.

Table:1 Material Quantities for Rail Central-Ashfield Land

1- Estate Roads	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Aggregate	61920	ROAD	100	20	T	3096
Tarmac	61920	ROAD	100	20	T	3096
Kerbs	950	ROAD	100	25	A	38
Fencing	1612	ROAD	100	6	A	269
Road Manholes/Gullies	191	ROAD	100	20	A	10
Pipes	810	ROAD	100	*28	A	30
Concrete In-Situ	4030	ROAD	100	15	C	269
Total Roads	131433					6808

* Maximum No of pipes is 65 per load, based on 28t load

2-Bridges on A43 Road	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Aggregate	840	ROAD	100	20	T	42
Concrete	2215	ROAD	100	15	C	148
Steel Beams	451	ROAD	100	20	A	23
Reinforcement	125	ROAD	100	30	A	5
Precast abutments	471	ROAD	100	30	A	16
Precast Decks	227	ROAD	100	6	A	38
Tarmac	280	ROAD	100	20	T	14
Fencing	21	ROAD	100	6	A	4
Total bridges	4630					290

4-Buildings						
Zone 1	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Steelwork	6670	ROAD	100	20	A	334
Claddings	1497	ROAD	100	6	A	250
Precast walls	1035	ROAD	100	30	A	35
M&E fittings	2453	ROAD	100	20	A	123
Concrete In-Situ	101025	ROAD	100	15	C	6735
Aggregates	96160	ROAD	100	20	T	4808
Reinforcement	614	ROAD	100	30	A	21
Ceilings/Plasterboard	96	ROAD	100	6	A	16
Kerbs	323	ROAD	100	25	A	13
Tarmac of carparks	5297	ROAD	100	20	T	265
Drainage						
Pipes	1113	ROAD	100	**28	A	44
Backfill of trenches	14652	ROAD	100	20	T	733
Manholes	231	ROAD	100	20	A	12
Concrete In-Situ	424	ROAD	100	15	C	29
Fittings	56	ROAD	100	25	A	3
Total Zone 1	231646					13421

Zone 2	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Steelwork	4982	ROAD	100	20	A	249
Claddings	1120	ROAD	100	6	A	187
Precast walls	774	ROAD	100	30	A	26
M&E fittings	1836	ROAD	100	20	A	92
Concrete In-Situ	76715	ROAD	100	15	C	5115
Aggregates	74768	ROAD	100	20	T	3739
Reinforcement	470	ROAD	100	30	A	16
Ceilings/Plasterboard	72	ROAD	100	6	A	12
Kerbs	344	ROAD	100	25	A	14
Tarmac of carparks	5346	ROAD	100	20	T	268
Drainage						
Pipes	1113	ROAD	100	**28	A	44
Backfill of trenches	14652	ROAD	100	20	T	733
Manholes	231	ROAD	100	20	A	12
Concrete In-Situ	424	ROAD	100	15	C	29
Fittings	56	ROAD	100	25	A	3
Total Zone 2	182903					10539

Zone-3	Weight (t)	Transport Mode	% by Road	Payload (t)	Viehicle	No of Vehicles
Steelwork	6685	ROAD	100	20	A	335
Claddings	1523	ROAD	100	6	A	254
Precast walls	1673	ROAD	100	30	A	56
M&E fittings	2496	ROAD	100	20	A	125
Concrete In-Situ	113731	ROAD	100	15	C	7583
Aggregates	111716	ROAD	100	20	T	5586
Reinforcement	726	ROAD	100	30	A	25
Ceilings/Plasterboard	96	ROAD	100	6	A	16
Kerbs	307	ROAD	100	25	A	13
Tarmac of carparks	7038	ROAD	100	20	T	352
Drainage						
Pipes	742	ROAD	100	**28	A	29
Backfill of trenches	9768	ROAD	100	20	T	489
Manholes	154	ROAD	100	20	A	8
Concrete In-Situ	283	ROAD	100	15	C	19
Fittings	37	ROAD	100	25	A	2
Total Zone 3	256975					14892

Zone-4	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Steelwork	6712	ROAD	100	20	A	336
Claddings	1517	ROAD	100	6	A	253
Precast walls	1051	ROAD	100	30	A	36
M&E fittings	2486	ROAD	100	20	A	125
Concrete In-Situ	100140	ROAD	100	15	C	6676
Aggregates	96357	ROAD	100	20	T	4818
Reinforcement	597	ROAD	100	30	A	20
Ceilings/Plasterboard	96	ROAD	100	6	A	16
Kerbs	293	ROAD	100	25	A	12
Tarmac of carparks	6545	ROAD	100	20	T	328
Drainage						
Pipes	742	ROAD	100	**28	A	29
Backfill of trenches	9768	ROAD	100	20	T	489
Manholes	154	ROAD	100	20	A	8
Concrete In-Situ	283	ROAD	100	15	C	19
Fittings	37	ROAD	100	25	A	2
Total Zone 4	226778					13167

Zone-5	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Steelwork	11219	ROAD	100	20	A	561
Claddings	2387	ROAD	100	6	A	398
Precast walls	1560	ROAD	100	30	A	52
M&E fittings	3913	ROAD	100	20	A	196
Concrete In-Situ	154355	ROAD	100	15	C	10291
Aggregates	145182	ROAD	100	20	T	7260
Reinforcement	912	ROAD	100	30	A	31
Ceilings/Plasterboard	160	ROAD	100	6	A	27
Kerbs	445	ROAD	100	25	A	18
Tarmac of carparks	7459	ROAD	100	20	T	373
Drainage						
Pipes	1113	ROAD	100	**28	A	44
Backfill of trenches	14652	ROAD	100	20	T	733
Manholes	231	ROAD	100	20	A	12
Concrete In-Situ	424	ROAD	100	15	C	29
Fittings	56	ROAD	100	25	A	3
Total Zone 5	344068					20028

**** Maximum No of pipes is 37 per load,based on 28t load**

5-Landscaping	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Plants and trees	3170	ROAD	100	20	A	159
Fencing/Stacks	160	ROAD	100	10	A	16
Seeds	1268	ROAD	100	20	A	63
Total Landscaping	4598					238

6-Intermodal (Zone 6)	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Aggregate	46452	ROAD	100	20	T	2323
Kerbs	290	ROAD	100	25	A	12
Fencing	220	ROAD	100	6	A	37
Pipes	1100	ROAD	100	**28	A	44
In-Situ Concrete	95466	ROAD	100	15	C	6365
Reinforcement	1442	ROAD	100	30	A	49
Steelwork of Depot	1158	ROAD	100	30	A	39
Cladding of Depot	379	ROAD	100	6	A	64
M&E fittings	437	ROAD	100	20	A	22
Precast Pit Units-Depot	2351	ROAD	100	25	A	95
Total Rail Terminal	149295					9050

Maximum payload of kerbs is 25t based on 38t Trailer

*** Maximum No of pipes is 37 per load, based on 28t load*

7-Express Freight Platform (Zone 7)	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Aggregate	6500	ROAD	100	20	T	325
Kerbs	60	ROAD	100	25	A	3
Pipes	300	ROAD	100	28	A	11
In-Situ Concrete	12980	ROAD	100	15	C	866
Reinforcement	2350	ROAD	100	25	A	94
Total Rail Terminal	22190					1299

Summary						
	Weight (t)	Transport Mode	% by Road	Payload (t)	Vehicle	No of Vehicles
Roads	131433	ROAD	100	Varies	Varies	6808
Bridges on A43 Road	4630	ROAD	100	Varies	Varies	290
Buildings (Zone 1 to 5)	1242370	ROAD	100	Varies	Varies	72047
Landscaping	4598	ROAD	100	Varies	Varies	238
Intermodal(Zone-6)	149295	ROAD	100	Varies	Varies	9050
Express Freight Platform	22190	ROAD	100	Varies	Varies	1299
Total=	1554516					89732

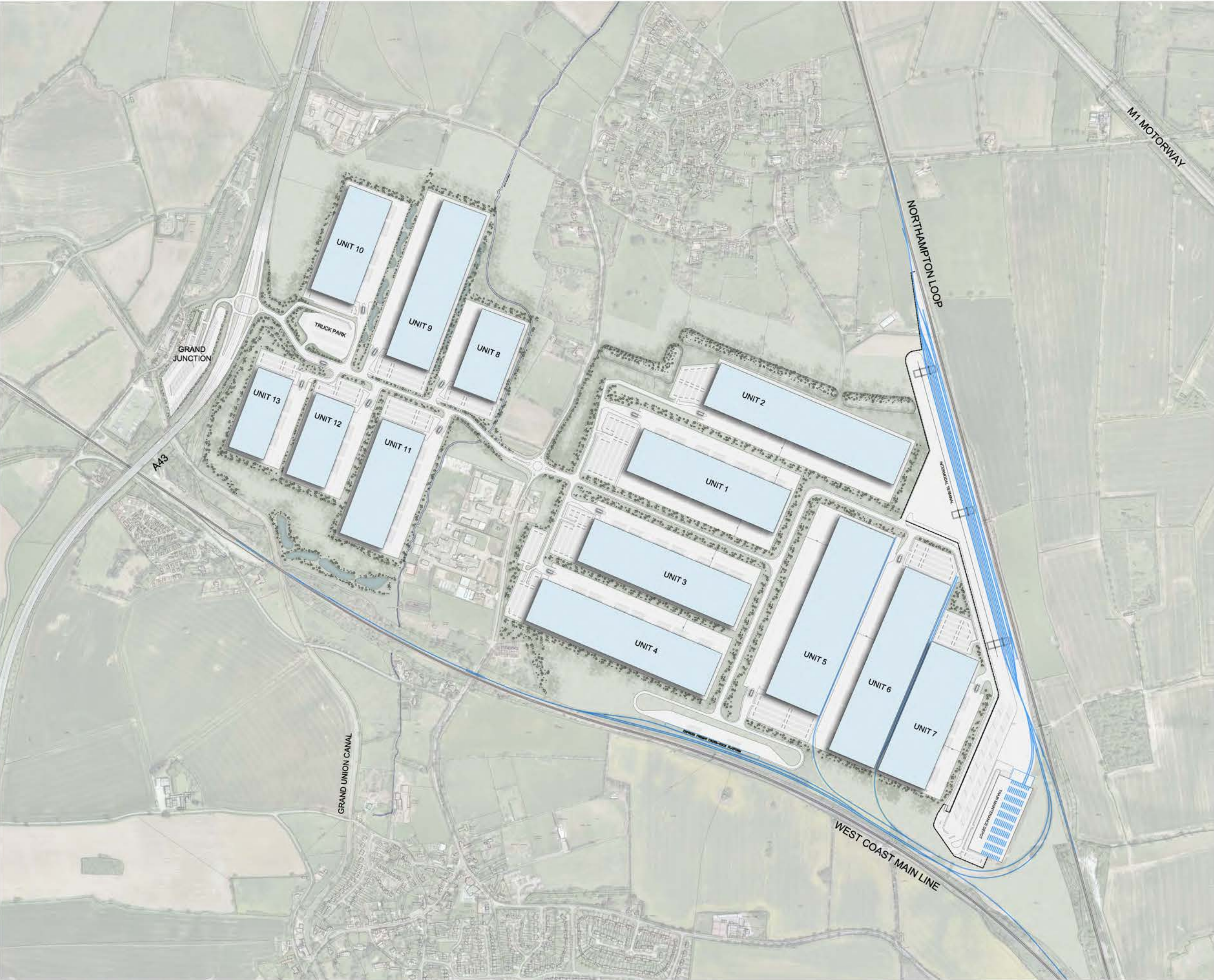
APPENDIX

Appendices

Michael Sparks Associates, Illustrative Masterplan, 30708-FE-43

RPS, Construction Traffic Assessment Key Plan, RPS-00-XX-DR-C-SK0007

Material calculations spreadsheets



NOTES:

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LEGEND

NEW RAILWAY ARRANGEMENT.
BASED ON: INTERMODALITY'S PROPOSED RAIL LAYOUT.
(DRAWING: IMT J0198 - D1.1)

AREA SCHEDULE
GIA

	sqm	sqft
1	54,684	588,615
2	71,443	769,015
3	59,179	637,005
4	67,445	725,980
5	85,638	921,805
6	72,933	785,050
7	53,102	571,590

UNITS 1-7 TOTAL 464,424 4,999,060

	sqm	sqft
8	28,836	310,390
9	57,804	622,205
10	39,186	421,800
11	41,968	451,740
12	27,385	294,770
13	24,638	265,200

UNITS 7-13 TOTAL 219,817 2,366,105

TOTAL FLOOR AREA 684,241 7,365,165

REV	DATE	NOTE	DRAW	CHK
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ASHFIELD LAND

TITLE

RAIL CENTRAL

DRAWING

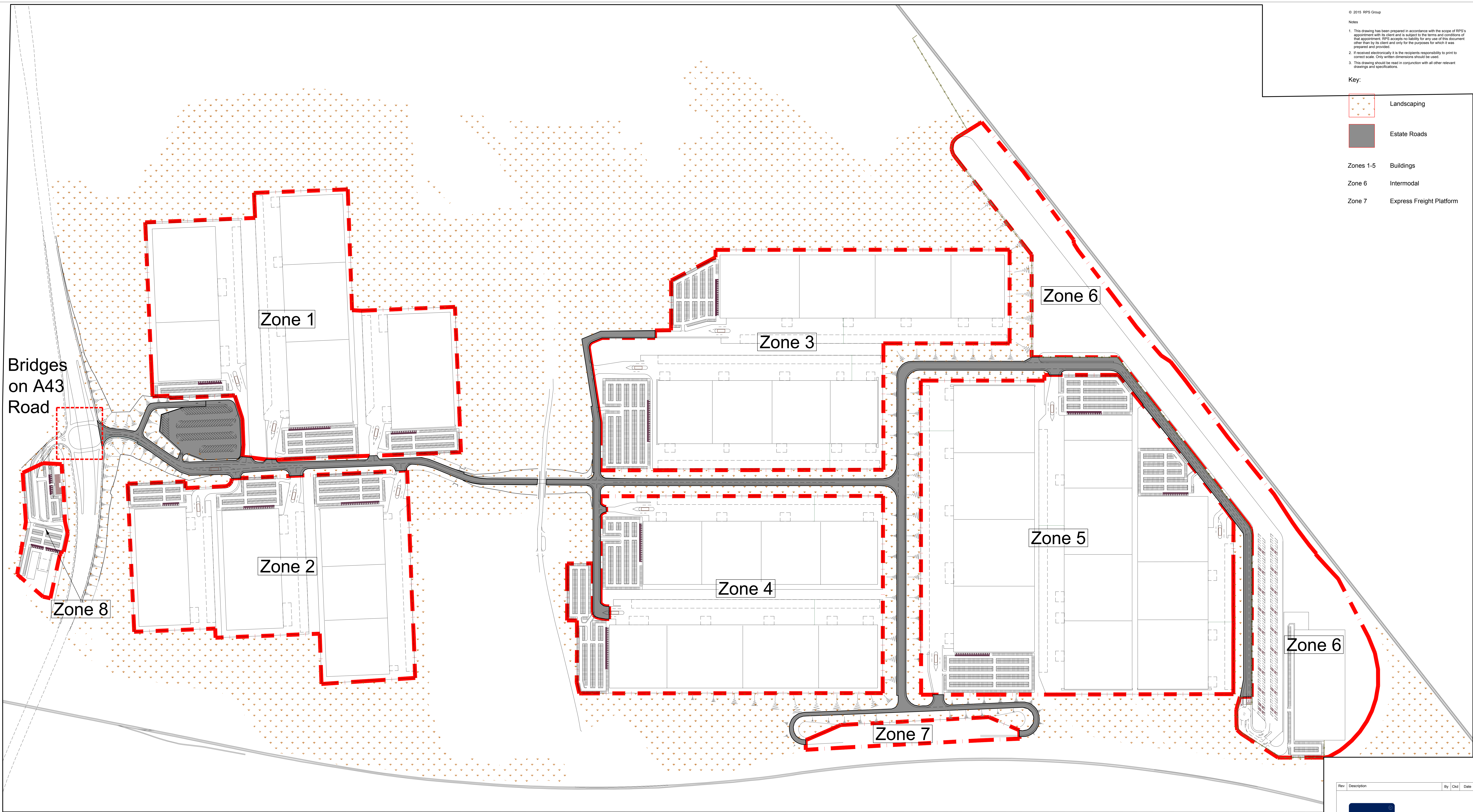
ILLUSTRATIVE MASTERPLAN

CLIENT

ASHFIELD LAND

DATE	SCALE	DRAWN
FEB 2016	1:5000@A1	PF
STATUS	FEASIBILITY	CHECKED
DRAWING NUMBER		MS/IC

30708-FE-43



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- Key:
- Landscaping
 - Estate Roads
 - Zones 1-5 Buildings
 - Zone 6 Intermodal
 - Zone 7 Express Freight Platform

Bridges
on A43
Road

Zone 1

Zone 3

Zone 6

Zone 2

Zone 4

Zone 5

Zone 8

Zone 7

Zone 6

Rev	Description	By	Out	Date
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Client **Ashfield Land**

Project **Rail Central**

Title **Construction Traffic
Assessment Key Plan**

Status	Scale	Date Created
Preliminary	1:2500 @A0	01/06/2016
Project Leader	Drawn By	Checked by
JKC	CW	AA

Document Number	Revision	Quantity
NK018318-RPS-00-XX-DR-C-SK0007	-	50

Project Number	Originator	Drawn	Check	Date	Quantity

Steelwork Weight- Buildings (Zone1 toZone5)			
Zone-1	Area	Area,office	Steel weight,ton
Building-8	28836	1441.8	1528.308
Building-9	57804	2890.2	3063.612
Building-10	39186	1959.3	2076.858
total=			<u>6669</u>
Zone-2	Area		
Building-11	41968	2098.4	2224.304
Building-12	27385	1369.25	1451.405
Building-13	24638	1231.9	1305.814
total=			<u>4982</u>
Zone-3	Area		
Building-1	54684	2734.2	2898.252
Building-2	71443	3572.15	3786.479
total=			<u>6685</u>
Zone-4	Area		
Building-3	59179	2958.95	3136.487
Building-4	67445	3372.25	3574.585
total=			<u>6712</u>
Zone-5	Area		
Building-5	85638	4281.9	4538.814
Building-6	72933	3646.65	3865.449
Building-7	53102	2655.1	2814.406
total=			<u>11219</u>

Plasterboard/ceilings			
Unit	Area-m2	kg/m2	Weight-Ton
1	2723	15	41
2	3518	15	53
3	2899	15	44
4	3316	15	50
5	3413	15	52
6	3352	15	51
7	2116	15	32
8	1417	15	22
9	2829	15	43
10	1888	15	29
11	2080	15	32
12	1331	15	20
13	1180	15	18
Total Floor slab Weight =			487 ton

Plasterboard/ceilings				
Buildings				
Zone-1	Area	Area,office	kg/m2	Weight-Ton
Building-8	28836	1441.8	15	22
Building-9	57804	2890.2	15	44
Building-10	39186	1959.3	15	30
total=				96
Zone-2	Area			
Building-11	41968	2098.4	15	32
Building-12	27385	1369.25	15	21
Building-13	24638	1231.9	15	19
total=				72
Zone-3	Area			
Building-1	54684	2734.2	15	42
Building-2	71443	3572.15	15	54
total=				96
Zone-4	Area			
Building-3	59179	2958.95	15	45
Building-4	67445	3372.25	15	51
total=				96
Zone-5	Area			
Building-5	85638	4281.9	15	65
Building-6	72933	3646.65	15	55
Building-7	53102	2655.1	15	40
total=				160

Cladding weight=		12.2 kg/m2		
Unit	Vertical Area ,m2	Weight-Ton	Roof Area,m2	Weight-Ton
1	17939	175.2	54450	664.3
2	22010	241.7	70350	858.3
3	18838.4	206.9	57963	707.2
4	20976	230.4	66312.5	809.1
5	22374.4	245.7	86272	1052.6
6	20260	222.5	67028	817.8
7	14177	155.7	42309.6	516.2
8	11250	123.6	28321.3	345.6
9	18482	203	56570	690.2
10	13664	150.1	37750	460.6
11	14645.76	160.9	41585	507.4
12	11163.2	122.6	26601	324.6
13	10676.4	117.3	23598	287.9
Depot	10192	112	21837	266.5

Total Cladding Weight	2355.6		8308.3
	4648		
	10663.9 Ton		

Buildings	
Zone-1	Weight-Ton
Building-8	345.6
Building-9	690.2
Building-10	460.6
total=	1497
Zone-2	
Building-11	507.4
Building-12	324.6
Building-13	287.9
total=	1120
Zone-3	
Building-1	664.3
Building-2	858.3
total=	1523
Zone-4	
Building-3	707.2
Building-4	809.1
total=	1517
Zone-5	
Building-5	1052.6
Building-6	817.8
Building-7	516.2
total=	2387

Precast Concrete weight					
Dock Leveler			Front walls	Rear walls	Total-for Table-1
Zones	Unit	No of front walls	Weight,Ton	Weight,Ton	
3	1	154	200.2	461	
	2	100	130	310	
			Total=	1101.2	1672.6
4	3	77	100.1	236	
	4	77	100.1	253.2	
			total=	689.4	1050.4
5	5	88	114.4	281.4	
	6	88	114.4	281.4	
	7	44	57.2	142.2	
			Total=	991	1558.4
1	8	33	42.9	94.2	
	9	77	100.1	240.6	
	10	44	57.2	138.6	
			Total=	673.6	1034.6
2	11	66	85.8	174	
	12	33	42.9	88.2	
	13	33	42.9	88.2	
			Total=	522	774
Total tonnage of Precst Dock walls =			3977.2 ton		

Service Yard R. Wall				
	Unit	No of Walls	Weight,Ton	
3	1	12	160.8	
	2	6	80.4	241.2
4	3	6	80.4	
	4	6	80.4	160.8
5	5	8	107.2	
	6	8	107.2	
	7	5	67	281.4
1	8	2	26.8	
	9	6	80.4	
	10	4	53.6	160.8
2	11	2	26.8	
	12	2	26.8	
	13	2	26.8	80.4
Total Weight=			925 Ton	

		Biscuit Slab			
	Unit	No of Biscuit slabs	Weight,Ton		
3		1	154	200.2	
		2	100	130	330.2
4		3	77	100.1	
		4	77	100.1	200.2
5		5	88	114.4	
		6	88	114.4	
		7	44	57.2	286
1		8	33	42.9	
		9	77	100.1	
		10	44	57.2	200.2
2		11	66	85.8	
		12	33	42.9	
		13	33	42.9	171.6
Total weight of Biscuit slab=			1188.2	Ton	

Total Precst concete tonnage= 6091 ton

Concrete Weights in Ton (Cast In-Situ)

Ground Floor Slab

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	Total-T-1	
3	1	54450	200	27225	62400	113730.8
	2	70350	200	35175		
4	3	57963	200	28981.5	62137.8	100139.9
	4	66312.5	200	33156.3		
5	5	86272	200	43136	97804.8	154355
	6	67028	200	33514		
	7	42309.6	200	21154.8		
1	8	28321.3	200	14160.7	61320.7	101024.7
	9	56570	200	28285		
	10	37750	200	18875		
2	11	41585	200	20792.5	45892	76714.55
	12	26601	200	13300.5		
	13	23598	200	11799		
	Total Floor slab Weight =			329555.3 ton		

External Hardstanding

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	47250	190	22443.75	37629.5
	2	31970	190	15185.75	
4	3	24730	190	11746.75	24358
	4	26550	190	12611.25	
5	5	29200	190	13870	35414.58
	6	28301	190	13442.975	
	7	17056	190	8101.6	
1	8	13485	190	6405.375	26241.38
	9	24585	190	11677.875	
	10	17175	190	8158.125	
2	11	18720	190	8892	20743.25
	12	11850	190	5628.75	
	13	13100	190	6222.5	
Total Concrete pavement tonnage=				144387 ton	

Depot		5800	190	2755	
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Concrete Weights in Ton (Cast In-Situ)

Zone	Area-m2	Thickness,mm	Weight-Ton
Terminal slab	79804	400	79804
depot	21837	200	10918.5

1988 12906.5

Total Concrete slab-terminal/Depot tonnage=	95465.5 ton
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Dock Platform	12980	400	12980
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Concrete Weights in Ton (Cast In-Situ)

Pad Foundations

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	2832	700	4956	
	2	3659	700	6403.3	11359.3
4	3	3015	700	5276.3	
	4	3449	700	6035.8	11312.1
5	5	4487	700	7852.3	
	6	3486	700	6100.5	
	7	2201	700	3851.8	17804.6
1	8	1473	700	2577.8	
	9	2942	700	5148.5	
	10	1963	700	3435.3	11161.6
2	11	2163	700	3785.3	
	12	1384	700	2422	
	13	1228	700	2149	8356.3
Total Pad foundation Weight =				59994 ton	

Depot		1136	700	1988	
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Concrete Weights in Ton (Cast In-Situ)

Offices

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	2723	150	1022	
	2	3518	150	1320	2342
4	3	2899	150	1088	
	4	3316	150	1244	2332
5	5	3413	150	1280	
	6	3352	150	1257	
	7	2116	150	794	3331
1	8	1417	150	532	
	9	2829	150	1061	
	10	1888	150	708	2301
2	11	2080	150	780	
	12	1331	150	500	
	13	1180	150	443	1723
Total Floor slab Weight =				12029 ton	

Total Tonnage of Concrete cast In-situ= **641431 ton**

Aggregate under Ground Floor Slab

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	Table-1	
3	1	54450	250	27225		
	2	70350	250	35175	62400	<u>111715.4</u>
4	3	57963	250	28981.5		
	4	66312.5	250	33156.3	62137.8	<u>96356.4</u>
5	5	86272	250	43136		
	6	67028	250	33514		
	7	42309.6	250	21154.8	97804.8	<u>145181.4</u>
1	8	28321.3	250	14160.7		
	9	56570	250	28285		
	10	37750	250	18875	61320.7	<u>96159.1</u>
2	11	41585	250	20792.5		
	12	26601	250	13300.5		
	13	23598	250	11799	45892	<u>74767.4</u>
Total =				329555.3 ton		

Aggregate under External Hard Standing
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Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	47250	260	24570	
	2	31970	260	16624.4	41194.4
4	3	24730	260	12859.6	
	4	26550	260	13806	26665.6
5	5	29200	260	15184	
	6	28301	260	14716.52	
	7	17056	260	8869.12	38769.64
1	8	13485	260	7012.2	
	9	24585	260	12784.2	
	10	17175	260	8931	28727.4
2	11	18720	260	9734.4	
	12	11850	260	6162	
	13	13100	260	6812	22708.4
Total =				158065.5 ton	

Total Aggregate Weight=	<u>524180 ton</u>
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	Aggregate under Rail terminal slab
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Zone	Area-m2	Thickness,mm	Weight-Ton
Terminal slab	79804	250	39902
Dock Platform	12980	250	6490
Depot	21837	150	6551.1
Total Aggregate tonnage=			52943.1 ton

	Aggregate under Carparks
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Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	16742	150	5023	
	2	10326	150	3098	8121
4	3	11187	150	3357	
	4	13984	150	4196	7553
5	5	11153	150	3346	
	6	8765	150	2630	
	7	8769	150	2631	8607
1	8	6240	150	1872	
	9	9504	150	2852	
	10	4621	150	1387	6111
2	11	8762	150	2629	
	12	6424	150	1928	
	13	5366	150	1610	6167
Total =				36559 ton	

Rebar Weights in Ton

Ground Floor Slab

Zones	Unit	Area-m2	Mesh-kg/m2	Weight-Ton	Table-1	
3	1	54450	2.22	140		
	2	70350	2.22	180	320	726
4	3	57963	2.22	148		
	4	66312.5	2.22	170	318	597
5	5	86272	2.22	221		
	6	67028	2.22	172		
	7	42309.6	2.22	109	502	912
1	8	28321.3	2.22	73		
	9	56570	2.22	145		
	10	37750	2.22	97	315	614
2	11	41585	2.22	107		
	12	26601	2.22	68		
	13	23598	2.22	61	236	470
Total Weight =				1691 ton		

Rebar Weights in Ton

External Hardstanding

Zones	Unit	Area-m2	Mesh-kg/m2	Weight-Ton	
3	1	47250	3.95	215	
	2	31970	3.95	146	361
4	3	24730	3.95	113	
	4	26550	3.95	121	234
5	5	29200	3.95	133	
	6	28301	3.95	129	
	7	17056	3.95	78	340
1	8	13485	3.95	62	
	9	24585	3.95	112	
	10	17175	3.95	79	253
2	11	18720	3.95	86	
	12	11850	3.95	54	
	13	13100	3.95	60	200
Depot		5800	3.95	27	

Total weight= 1388 ton

Rebar Weights in Ton

Reinforcement for offices

Zones	Unit	Area-m2	Mesh-kg/m2	Weight-Ton	
3	1	2723	6.16	20	
	2	3518	6.16	25	45
4	3	2899	6.16	21	
	4	3316	6.16	24	45
5	5	4314	6.16	31	
	6	3352	6.16	24	
	7	2116	6.16	15	70
1	8	1417	6.16	11	
	9	2829	6.16	21	
	10	1888	6.16	14	46
2	11	2080	6.16	15	
	12	1331	6.16	10	
	13	1180	6.16	9	34
Total Weight =				240 ton	

Total Tonnage of rebar= **3319 ton**

Reinforcement of Rail terminal slab

Zone	Area-m2	Mesh-kg/m2	Weight-Ton
Terminal slab	79804	6.16	1132
Depot	21837	6.16	310
Total weight=			1442 ton

Dock Platform	12980	6.16	184
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Traffic Loading more than 20 msa

Road Construction
Tarmac and Aggregate

Layer	Area,m2	Thickness,mm	Weight, Ton
Surface Course	70200	40	} 61,916.40
Binder Course	70200	60	
Base	70200	250	
Foundation(Aggregarte)	70200	420	61916.4

Road Construction

Kerbs

Total Length,m	HB2, Weight kg/m	Total tonnage
11255	70	788
2229	70	157
	Total=	945

Concrete Cast in-situ for kerbs

ST4 Grade Concrete

Total Length,m	ST4 Concrete (m2)	Concrete Volume,m3	Total tonnage
11255	0.1298	1461	3361
2229	0.1298	290	667
		Total=	4028

Tarmac of carpark-Buildings

Zones	Unit	Area-m2	Thickness,mm	Weight-Ton	
3	1	16742	100	4353	
	2	10326	100	2685	7038
4	3	11187	100	2909	
	4	13984	100	3636	6545
5	5	11153	100	2900	
	6	8765	100	2279	
	7	8769	100	2280	7459
1	8	6240	100	1623	
	9	9504	100	2472	
	10	4621	100	1202	5297
2	11	8762	100	2279	
	12	6424	100	1671	
	13	5366	100	1396	5346
Total =				31685	ton

Kerbs

Zones	Unit	Total length,m	HB2, Weight kg/m	Weight,Ton	
3	1	2366	70	165.62	
	2	2017	70	141.19	306.81
4	3	1917	70	134.19	
	4	2268	70	158.76	292.95
5	5	3901	70	273.07	
	6	2459	70	172.13	
	7		70	0	445.2
1	8	1390	70	97.3	
	9	1940	70	135.8	
	10	1275	70	89.25	322.35
2	11	2000	70	140	
	12	1452	70	101.64	
	13	1455	70	101.85	343.49
Total Concrete pavement tonnage=				1711	ton

Kerbs-Rail Terminal			
Unit	Total length,m	HB2, Weight kg/m	Weight,Ton
1	3977	70	279

Kerbs-Rail Terminal			
Unit	Total length,m	HB2, Weight kg/m	Weight,Ton
Intermodal	3750	70	263
Platform	875	70	62

Services of buildings

	Unit	Area-m2	Services Weight kg/m2	Weight-Ton	Sub Total
Zone-3	1	54450	20	1089	
	2	70350	20	1407	2496
Zone-4	3	57963	20	1159.3	
	4	66312.5	20	1326.3	2486
Zone-5	5	86272	20	1725.5	
	6	67028	20	1340.6	
	7	42309.6	20	846.2	3913
Zone-1	8	28321.3	20	566.5	
	9	56570	20	1131.4	
	10	37750	20	755	2453
Zone-2	11	41585	20	831.7	
	12	26601	20	532.1	
	13	23598	20	472	1836
Total Floor slab Weight =				13183	ton

Drainage pipes

Bldg	Pipes	Dia	Length,m	Weight,kg/m	*Total Weight,Ton	No of Pipes	Trucks
3	Foul	150φ	703	1.7	2	235	

* Allow for pipe fittings,etc

Bldg	Pipes	Dia	Length,m	Weight,kg/m	Total Weight,Ton	No of Pipes	**Trucks
3	Surface	450φ	1306	284	371	523	14

**Based on a 28T load, exact quantity per load to be confirmed

Total Tonnage of drainage pipes for all buildings = 4849

Manhole

Bldg	Length,m	No.	Weight,Ton	Total Weight
3	703	8	3.3	27
	1306	15	3.3	50

Total Tonnage of Manholes for all buildings = 1001

Manhole cover slab weight=855kg

manhole weight=1215kg/m

manhol weight=2*1.215+0.855=3.3ton

Aggregate for pipes backfill

	Area,m2	Length	Volume,m3	Tonnage
SW	1.341	1306	1751.346	3503
Foul	0.982	703	690.346	1381

Total tonnage of aggregate backfill for all buildings= 63492

Manhole

Zones	Length,m	No.	Weight,Ton	Weight,ton	sub total
3	703	8	3.3	27	
	1306	15	3.3	50	154
4	703	8	3.3	27	
	1306	15	3.3	50	154
5	703	8	3.3	27	
	1306	15	3.3	50	
					231
1	703	8	3.3	27	
	1306	15	3.3	50	
					231
2	703	8	3.3	27	
	1306	15	3.3	50	
					231

Drainage pipes

Zones	Unit	Length,m	Weight,kg/m	Weight,Ton	sub total	No of Pipes	**Trucks
3	1	1306	284	371			
	2	1306	284	371	742	1045	29
4	3	1306	284	371			
	4	1306	284	371	742	1045	29
5	5	1306	284	371			
	6	1306	284	371			
	7	1306	284	371	1113	1568	44
1	8	1306	284	371			
	9	1306	284	371			
	10	1306	284	371	1113	1568	44
2	11	1306	284	371			
	12	1306	284	371			
	13	1306	284	371	1113	1568	44

Aggregate for pipes backfill

Zones	Area,m2	Length	Volume,m3	Tonnage	sub total
3	1.341	1306	1751.346	3503	
	0.982	703	690.346	1381	9768
4	1.341	1306	1751.346	3503	
	0.982	703	690.346	1381	9768
5	1.341	1306	1751.346	3503	
	0.982	703	690.346	1381	
					14652
1	1.341	1306	1751.346	3503	
	0.982	703	690.346	1381	
					14652
2	1.341	1306	1751.346	3503	
	0.982	703	690.346	1381	
					14652

Concrete In-Situ(Surrounding manholes)

Zones	No.manhole	Conc. Vol	Weight,ton	Sub total,ton
3	23	2.56	141.312	283
4	23	2.56	141.312	283
5	23	2.56	141.312	424
1	23	2.56	141.312	424
2	23	2.56	141.312	424

Drainage of Roads					
Total Rd Length,m	Dia	Weight,kg	Total Weight,Ton	No of Pipes	Trucks
4750	300φ	425	808	1900	30

weight

No of manholes= 53 174.9

No of gullys 48 15.36 1 truck

190.26

2 trucks -covers

1 truck gullies

7 truck rings

Bridges

Concrete In-Situ

Item	No	Volume	Weight,ton
Pire	4	25.2	252
foundation	4	100	1000
Deck Slab	1	308	770

Total Tonnage of concrete In-Situ= 2022 ton

Reinforcement

Item	No	Volume	Quantity kg/m3	Weight,ton
Pire	4	25.2	270	28
foundation	4	100	125	50
Deck Slab	1	308	150	47

Total Tonnage of concrete In-Situ= 125 ton

Precast Deck-Omnia

****Deck thickness=60mm,Hanson**

Length,m	No. of decks	Width,mm	Weight,kg/m	Total Weight,ton	No of Pallets
30	300	300	36	32.4	12.5
30	300	300	36	32.4	12.5
75	750	300	36	81	31.25
75	750	300	36	81	31.25
				227	88

Tarmac

Area	Thickness,mm	Volume	Weight,ton
1540	70	107.8	281

Aggregate

backfill for:

No	Vol,m3	Tonnage
foundation	4	100
		840

Precast bridge abutments

Length	Height	Thickness,mm	Vol	Tonnage
137	5.5	250	188.375	471

Landscaping

Area	Weight,kg/m2	Tonnage
11395	20	227.9
28300	20	566
26847	20	536.94
32802	20	656.04
71882	20	1437.64
15880	20	317.6
20247	20	404.94
35267	20	705.34
26858	20	537.16
16690	20	333.8
9470	20	189.4
6170	20	123.4

Total=	316898.4	6338 ton
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Area	Weight,kg/m2	Tonnage
11395	8	91.16
28300	8	226.4
26847	8	214.776
32802	8	262.416
71882	8	575.056
15880	8	127.04
20247	8	161.976
35267	8	282.136
26858	8	214.864
16690	8	133.52
9470	8	75.76
6170	8	49.36

316898.4	2536 ton
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Fencing

Length,m	kg/m	Weight,ton
3440	6	20.64
1650	6	9.9
1840	6	11.04
1180	6	7.08
1829	6	10.974
2797	6	16.782
1050	6	6.3
2457	6	14.742
2466	6	14.796
910	6	5.46
1517	6	9.102
2628	6	15.768
661	6	3.966
total=		146.55

Steelwork			
Building	Area	Area,office	Steel weight,ton
Depot	21837	1092	1158

M&E fittings

Building	Area	wt. kg/m2	Tonnage
Depot	21837	20	437

Precast pit units (Swimming pool)

Weight,ton	No	Total weight
12.775	92	1175.3
12.775	92	1175.3

2351