



TACTRAN Tayside and Central Scotland Transport Partnership

Dundee West Park & Ride Detailed Design and Appraisal

Technical Report

June 2011

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1 Introduction

1.1 Introduction

1.1.1 This report summarises the final scheme designs for two alternative sites to the west of Dundee. Site locations were identified from the previous 'A90 West of Dundee Park & Ride Study', undertaken by Colin Buchanan.

1.1.2 Site 3 is located on the western periphery of Dundee and is bound by the A90 to the south, the Landmark Hotel to the northeast and farmland to the north and west. Site 6b is located to the west of Dundee Riverside Airport and is bound by Wright Avenue to the east and the proposed Riverside Nature Park site to the west and north.

1.1.3 Site locations are shown in Figure 1.1.

1.2 Site parameters

1.2.1 In accordance with the study proposal, three preliminary design options were to be developed for each site. These were then refined to identify a preferred option for each. Full details of this process are given in a separate Technical Note "Park & Ride, Initial Detailed Design".

1.2.2 Design options took account of local site conditions. Parameters for each site included, but were not limited to the following:

- 400 parking spaces, including appropriate disabled bay provision and 6 spaces allocated for electric vehicles
- clear pedestrian routes to and within the site
- the provision of cycle facilities
- waiting facilities – initially high quality bus type shelters but with appropriate servicing to provide a waiting area in the future, and
- provision for overnight lorry parking (12 HGV's)

1.2.3 While the design options permit overnight lorry parking, dedicated spaces are not provided. Instead, designs permit lorry parking at 90 degrees to the car parking spaces.

1.2.4 Junction spacing and car park designs have been developed in accordance with Dundee City Council (DCC) development guidelines and Transport Scotland requirements where appropriate.

1.2.5 As designs developed further, additional requirements were agreed:

- there should be two clearly defined bus bays at each site, ideally with a shallow saw-tooth arrangement, as found at existing bus stops within Dundee city centre
- a separate bus layover should also be provided
- there should be a clearly defined bus only area, distinguished from the rest of the site by an alternative strengthened road surface
- the waiting area should be centrally located within the parking area
- appropriate cycle storage should be provided with linkages provided to the pedestrian and cycle network
- proposed landscaping locations should be identified
- it may be more efficient and provide clearer routing if parking bays are in the same direction across the site, except round the perimeter, and
- there should be provision for CCTV, lighting and real time bus information

Figure 1.1: General site locations



2 Site 3 design

2.1 General design

- 2.1.1 Drawing 192791/OS/104 in Appendix A shows the proposed layout of Site 3. The design has been oriented to suit the sloping nature of the site; aisles are positioned to run east / west with parking bays orientated north / south. This allows the site to be graded appropriately, minimising quantities of cut and fill.
- 2.1.2 The bus waiting area is located in the centre of the site and orientated to face east, in order to ensure a level area. Two bus bays have been provided, one to serve the city centre and one to serve Ninewells Hospital. These have a shallow saw-tooth arrangement, as found at existing bus stops within Dundee city centre. A separate bus waiting area has also been included.
- 2.1.3 A total of 26 disabled bays are located within a short distance of the waiting area. Cycle storage and 6 electric car charging points are also proposed.
- 2.1.4 Clear pedestrian routes have been designated within the car park area. Links are also provided to the external pedestrian and cycle network.
- 2.1.5 General access to the site (including bus access) is via a new link road from the Dykes of Gray Road. A slip road is provided from the A90 allowing users of the site to bypass peak period queues on the approach to the Landmark Roundabout.
- 2.1.6 The Dykes of Gray Road / general access junction is approximately 40m north of the Landmark Roundabout. The general access then crosses the Site of Important Nature Conservation (SINC) and floodplain and bridges the Mill Lade. Where the road crosses the floodplain, it is on embankment, with a series of flood arches to allow water flow during flood conditions. The access road has been designed in accordance with Dundee City Council road standards "Dundee - Streets Ahead". This gives guidance on appropriate road width, horizontal and vertical alignment, and pedestrian footway requirements.
- 2.1.7 The off-slip from the A90 is approximately 230m long and has been designed to meet TD41/95 - vehicular access to all-purpose trunk roads.
- 2.1.8 A total of 407 car parking spaces are provided. In addition, provision has been made for overnight lorry parking, with space for 12 vehicles. These would be provided in the southern section of the site only. In this area, aisles widths, turning radii and the pavement design have been specified to accommodate HGV's.

2.2 Lay-by

- 2.2.1 The provision of the proposed off-slip will require the relocation of the existing lay-by. New lay-bys designs are covered in TD 69/07 which states that for roads of a standard similar to the A90, the adjoining lay-by should be Type A with merge/diverge tapers.
- 2.2.2 An indicative design is shown in Appendix A. This could be amended to incorporate the bus stop within the lay-by, ensuring that merge and diverge tapers fully meet current design standards.

2.3 Drainage design

- 2.3.1 It is proposed that drainage from the Park & Ride site would be by a gravity system, with an attenuation area providing surface water balancing and storage in high storm events. It may

be possible that permeable paving can be used in areas where no buses or large vehicles are present. No allowance however has been made at this time for any infiltration to the existing sub strata.

2.3.2 The attenuation area has been calculated using a discharge rate based on green field run off for the 1:100 year storm event plus 30% climate change. This provides for a storage volume of approximately 1,200m³.

2.3.3 It is envisaged that the attenuation area would be a dry basin with water passing through at all storm events but only filling the basin at high events. It may be possible to provide a permanent wet feature to provide ecological benefit if required.

3 Site 6b design

3.1 General design

- 3.1.1 Drawing 192791/OS/202 Rev A in Appendix A illustrates the general arrangement of Site 6b. The shape of the site has been developed to minimise its impact on the existing area of planting area in the northwest quarter. While this results in an L-shape site, it makes best use of the proposed Nature Park design.
- 3.1.2 A further constraint is the need to provide a minimum junction spacing distance of 40m on Wright Avenue, between the Park & Ride access and the distribution centre access to the south. This results in an S-shape access road into the site, designed in accordance with DCC “Dundee - Streets Ahead” guidelines.
- 3.1.3 As with Site 3, a bus only turning and waiting area is provided in the centre of the site. Two separate stands are provided for city centre and Ninewells Hospital services; a bus layby is also included.
- 3.1.4 A total of 15 disabled parking bays are proposed together with 6 electric vehicle charging points. Cycle storage would be provided adjacent to the waiting shelter.
- 3.1.5 Pedestrian routes to the waiting area have been defined from all areas of the car park; connections are also provided to the external road network and adjacent Nature Park. Links along Wright Avenue provide connections to Dundee’s Green Circular Cycle Route.
- 3.1.6 The layout provides a total of 395 spaces. Provision has been made for overnight lorry parking with space for 12 vehicles, parking across car bays, in the northern section of the car park. Aisles widths, turning radii and the pavement design have all been specified to accommodate HGV’s.
- 3.1.7 A new 36m ICD roundabout on Riverside Avenue is proposed to provide access to the site via Wright Avenue. It has been designed to provide 2 approach lanes on Riverside Avenue, east and westbound and provides an appropriate level of traffic capacity in both morning and evening peaks.
- 3.1.8 The roundabout has been positioned so that private land to the north and southeast is not encroached – a small portion of land would be taken from the Nature Park but this is owned by Dundee City Council.
- 3.1.9 A 3.0m footpath / cycle link is proposed on the western side of Wright Avenue from the roundabout to the site.

3.2 Drainage design

- 3.2.1 The drainage proposals consist of a gravity system with attenuation under the car park. Attenuation would be in the form of storage crates with a restricted discharge rate to the adjacent drainage outfall pipe.
- 3.2.2 The attenuation area has been calculated using a discharge rate based on green field run off for the 1:100 year storm event plus 30% climate change. This provides for a storage volume of approximately 1000m³. Due to the low lying nature of the site it is proposed to restrict the depth of the storage crates to 500mm.
- 3.2.3 An alternative is to utilise an open attenuation basin as for Site 3. This would be situated between the southern car park and Wright Avenue with a linkage ditch situated on the other

side of the access road. Further work is required to determine the viability of this option. The site is relatively flat and the drainage depth at this point, some 150m away from the furthest drainage location could be well over 2m deep. With the adjacent carriageway being close there may not be enough room to provide a viable drainage and landscaping area.

4 Walking and cycling access

4.1 Access to Site 3i

4.1.1 As noted above, a 3.0m wide pavement would be provided on the north side of the access road to Dykes of Gray Road. This would tie into the existing footway network to the west of Dundee.

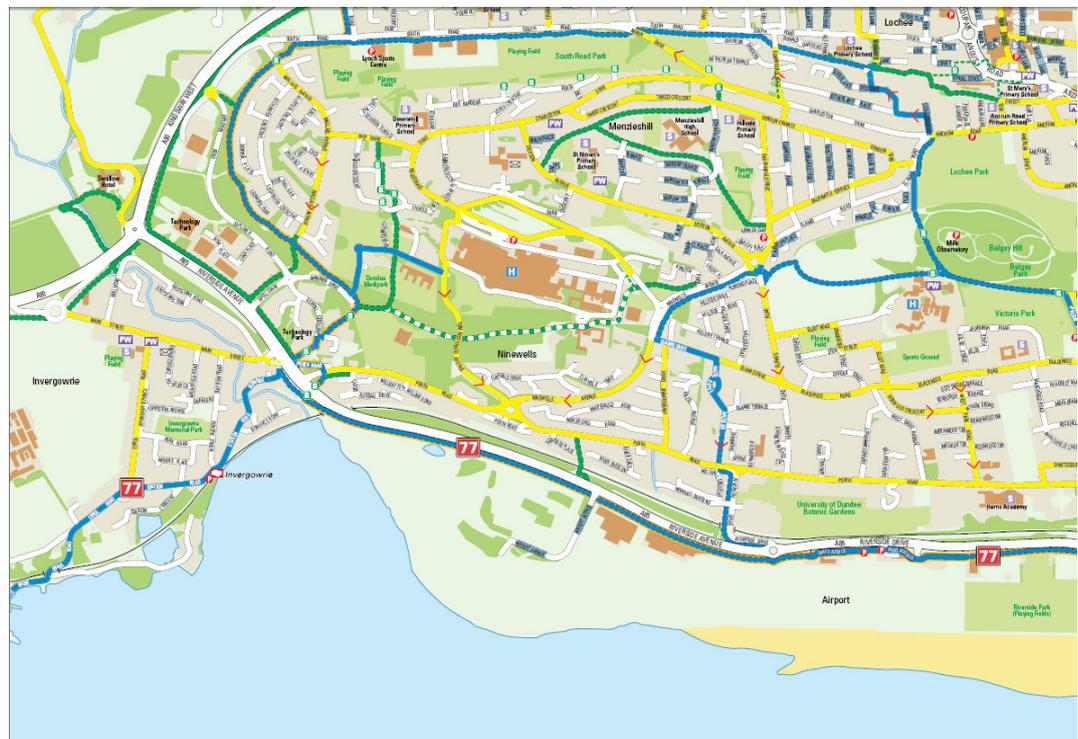
4.1.2 An existing cycle path is directly adjacent to the eastern edge of the site. Direct access will be provided, giving a direct cycle link between the site and Invergowrie and onwards to the city centre. Cycle storage will be provided allowing users to either park at the site and cycle to their destination or cycle to the site and travel onwards by bus.

4.2 Access to Site 6b

4.2.1 A new pedestrian footpath would be provided on the west side of Wright Avenue linking the Park & Ride site with the local footway network. The site has also been designed to tie in with the proposed footpath network of the adjacent Nature Park.

4.2.2 Links along Wright Avenue give connections to Dundee's Green Circular Cycle Route (77). Eastbound, this provides an unbroken route from the site to Dundee Waterfront. It also offers links to Invergowrie and westwards towards Perth. Cycle storage facilities would be provided. As for Site 3i, this will allow users to either park at the site and cycle to their destination or cycle to the site and travel onwards by bus.

Figure 4.1: Cycle network adjacent to Site 6b



5 Materials specification

5.1 Materials specification

5.1.1 Dundee City Council design guidance has been used to specify the materials used within the design options above.

5.1.2 It is envisaged that all roads and car parks would be Asphalt Concrete with the exception of the bus parking and turning bays which will be a flexible composite construction. Where permeable paving is used within the car park areas, then costs are comparable with a standard asphalt and gravity drainage system.

5.1.3 All kerbing would be HB2 precast concrete kerbs.

5.2 Pavement specification

Car / HGV overnight lorry parking

5.2.2 The pavement specification used for the access roads, and areas of car parks used for HGV parking, is based on the specification for a primary and district distributor and industrial access road. This comprises of:

- 40mm Asphalt Concrete Surface Course
- 60mm Asphalt Concrete Binder Course
- 150mm Asphalt Concrete Base Course
- 200mm Granular Type 1 Sub-base

5.2.3 This assumes a CBR of 5% and no capping layer used. This equates to a pavement design based on 4msa using DMRB.

Car parking only

5.2.4 The pavement specification used for the areas of car parks used for parking only is based on the specification for a local distributor road. This comprises of:

- 40mm Asphalt Concrete Surface Course
- 50mm Asphalt Concrete Binder Course
- 120mm Asphalt Concrete Base Course
- 240mm Granular Type 1 Sub-base

5.2.5 This assumes a CBR of 5% and no capping layer used.

Bus parking and turning area

5.2.6 The pavement specification used for the bus parking and turning areas is based on a minimal DMRB composite pavement specification. This comprises of:

- 40mm Asphalt Concrete Surface Course
- 60mm Asphalt Concrete Binder Course
- 150mm Continuously Reinforced Concrete Base
- 200mm Granular Type 1 Sub-base

5.2.7 This assumes a CBR of 5% and no capping layer used.

5.3 Site 6b – capping layer

- 5.3.1 A full Ground Investigation was undertaken at Site 6b in spring 2010 and borehole information from this survey has been reviewed. Although at the upper levels, boreholes are generally showing gravelly materials, at lower levels there are compressible fills. Given the generally poor ground conditions, at this stage of design development, a capping layer of 600mm has been assumed across the site.

6 Scheme costs

6.1 Introduction

6.1.1 This chapter summarises the costs involved in planning, designing and constructing the designs for Sites 3 and 6b. For each site two options have been prepared,

- one based on a pavement design for a car only car park, and
- one based on a pavement design which includes overnight lorry parking in part of each site.

6.1.2 Scheme costs for each option are given in Appendix B.

6.2 Cost estimates

6.2.1 Cost estimates have been derived from SPON's Civil Engineering and Highway Works Price Book 2011 – Part 5 Unit Costs (Highway Works). It should be noted that:

- costs are based on present day figures (excluding inflation)
- no allowance has been made for tree preservation orders
- prices will vary depending on type and quantity of street furniture, an allowance has been made for preliminary estimation
- costs provided are based on the topographical survey, available ground investigation information and the indicated preliminary design

6.2.2 The cost estimate has been undertaken during a time of economic instability. The rates used are industry standard costs however SPON's warn that the market is, and has been, very susceptible to cost fluctuations and that the rates are based on an average costs. It is therefore imperative that prior to implementing the works a robust cost estimate is carried out, particularly to assess fluctuations in material costs that may have affected rates.

6.3 Infrastructure costs

6.3.1 Infrastructure costs are comprised of the following elements:

- Car park costs
- Additional drainage and attenuation works, and
- access roads / site access

6.3.2 Table 6.1 summarises the infrastructure costs at each site.

Table 6.1: Infrastructure costs

	Site 3i	Site 6b
Car park	£1,000,758	1,297,608
Drainage and attenuation works	£20,000	£20,000
Link Road	£1,288,500	
A90 slip road	£144,044	
Lay-by	£121,000	
Footways		£53,515
Roundabout		£151,438
Total	£2,574,302	£1,522,561

6.4 Other delivery costs

6.4.1 The estimates provide costs for other elements of the delivery of the scheme, as given in Table 6.2. These include:

- contractors preliminaries, traffic management and contingencies based on a percentage of the construction cost and the landscaping. These costs together with the Infrastructure cost subtotal would be equivalent to tenders returned to construct the works
- site investigations for surveys that may be required to design the works
- design costs – these are the costs to facilitate the site investigations, design the works and achieve technical approval
- utilities – provisional sums to divert or reinforce existing utilities affected by the works and a small allowance for supply to the site

Table 6.2: Other delivery costs

	Site 3i	Site 6b
Contractors preliminaries (20%)	£514,860	£304,512
Traffic management (5%)	£146,865	£76,128
Contingencies	£386,145	£228,384
Site investigation	£20,000	£20,000
Landscaping	£65,000	£65,000
Design fees	£169,904	£100,489
Site supervision	£61,783	£36,541
Utilities	£120,000	£100,000
Total	£1,484,558	£931,055

6.4.2 Consultants' fees have been calculated using the Association of Consulting Engineers Conditions of Engagement, Agreement A1 based on a percentage fee of 5.5%. Site supervision has been calculated based on a percentage fee of 2%. The remaining fees are based on previous like for like studies and are therefore best estimates.

6.4.3 The utilities fees are an estimate based on previous like for like costs however this fee is wholly dependent on various factors that cannot be ascertained at this time, namely; the type of utility i.e. standard or fibre optic cable, the depth, the requirement for relocation, the age and condition of the infrastructure, etc.

6.4.4 Therefore, prior to implementation it will be necessary to undertake detailed discussions with statutory undertakers to ascertain precise costs and constraints.

6.5 Land costs

6.5.1 Land acquisition costs have been evaluated by Montagu Evans based on current market rates. At Site 3, the cost of land acquisition has been estimated to be £20,000 per acre (£49,421 per hectare), at Site 6b the value is estimated at £10,000 per acre (£24,710 per hectare).

6.5.2 The approximate land take area of each site is shown in Figures 6.1 and 6.2.

Figure 6.1: Site 3i – land purchase area

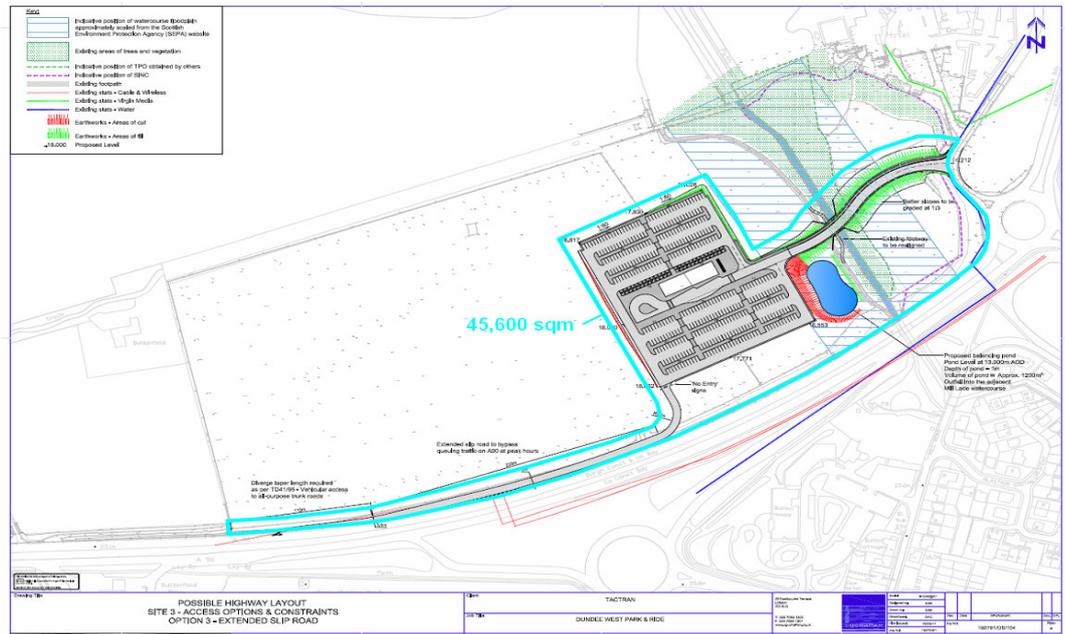
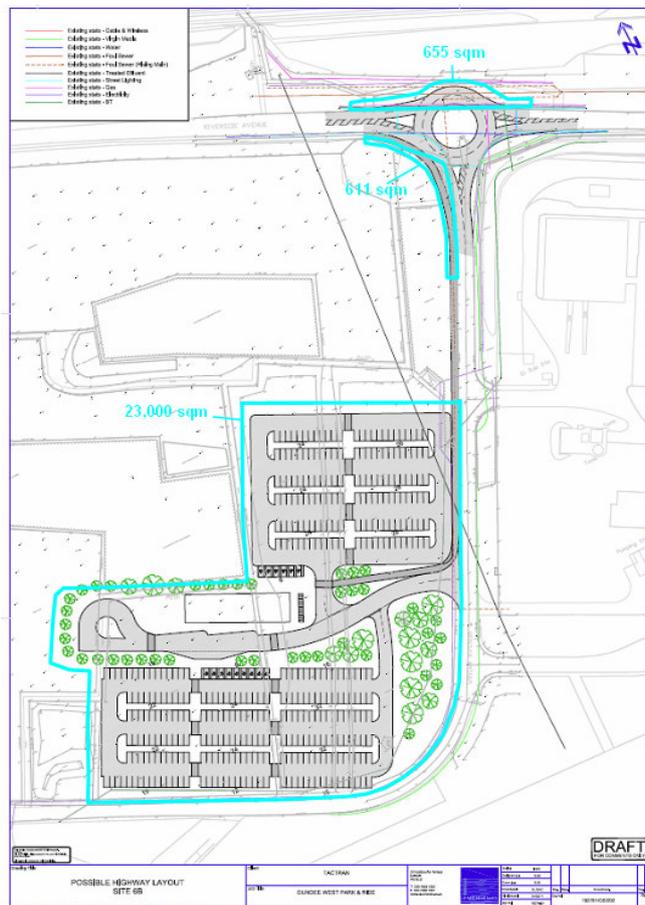


Figure 6.2: Site 6b – land purchase area



6.5.3 The resulting land acquisition cost is:

- Site 3i $45600\text{m}^2 * \text{£}49,421/10,000 = \text{£}242,657$
- Site 6b $24266\text{m}^2 * \text{£}24,710/10,000 = \text{£}59,963$

6.6 Total capital costs

6.6.1 Total capital costs are summarised in Table 6.3.

Table 6.3: Total capital costs

	Site 3i	Site 6b
Base cost (excl contingencies)	£3,672,715	£2,225,232
Contingencies (15%)	£550,907	£333,785
Planning fees – (5% of base cost excl contingencies)	£183,636	£111,262
Total base capital cost	£4,407,258	£2,670,279
Land	£242,657	£59,963

6.6.2 A risk workshop, undertaken as part of the business case, identified appropriate optimism bias uplifts for each site in respect of investment costs. These are:

- Site 3i – 13.7%
- Site 6b – 12.8%

Table 6.4: Total capital costs including optimism bias

	Site 3i	Site 6b
a Base costs	£3,672,715	£2,225,232
b Contingencies	£550,907	£333,785
c 5% planning / permissions	£183,636	£111,262
d=a+b+c Total cost	£4,407,258	£2,670,279
e=a+c Total excl contingencies	£3,856,350	£2,336,494
f=e*OB% Optimism bias	£528,320	£299,071
g=d+f Capex	£4,935,578	£2,969,350
h Land	£242,657	£59,963
i=g+h Grand total	£5,178,235	£3,029,312

Overnight lorry parking

6.6.3 Overnight lorry parking would require a stronger pavement design in designated areas of each site. Total costs would be only marginally higher than for a car only site. These costs are given in Appendix B for information.

7 Ground conditions / environmental survey

7.1 Introduction

7.1.1 Scheme design development has been informed the following surveys:

- Topographical Survey
- Ground Condition Survey
- Desktop Environmental Survey, and
- Desktop Utilities Survey

7.1.2 A summary of each is given below.

7.2 Topographical survey

7.2.1 A topographical survey of Site 3i and Site 6b was undertaken by Douglas Land Surveys. Work commenced in November 2010 but, due to weather, was not completed until January 2011.

7.2.2 The survey provided detailed position and level information to support the detailed design. The coverage of each survey is shown in Appendix C.

7.2.3 All topographical information has been supplied to the client electronically.

7.3 Ground conditions survey

7.3.1 A ground investigation survey of the area around and including Site 6b was undertaken by MacLeod Consulting in May 2010. The survey was undertaken as part of the design and development of the proposed nature park on Riverside Avenue.

7.3.2 The final report¹ summarises the characteristics of the site and existing and proposed land uses. A Conceptual Site Model (CSM) has been used to identify receptors that may be affected by potential sources of contamination on the site or the surrounding land.

7.3.3 A Phase 2 ground investigation was also undertaken. The location of the trial pits undertaken are shown in Appendix C for information. These highlighted the depth of cover over contaminated ground and have informed the development of the pavement design, outlined in Chapter 4.

7.3.4 The report concludes that the soil analyses results indicate no significant risk to human health and show an obvious consistency in terms of contaminants of concern across the site. The conceptual Site Models predict Low to Very Low risks to both human and ecosystem receptors.

7.3.5 A copy of the report has been provided to the client.

7.4 Ground conditions survey and phase 1 land quality assessment

7.4.1 SKM Enviro undertook a ground conditions survey for each site using commercially available environmental database information from Landmark Information Group. This has been used to undertake a preliminary risk assessment as part of a Phase 1 desk study, including a walkover survey of the site.

¹ Riverside Landfill Site, Cover Completion, Risk Assessment for Intended Site Use – May 2010 MacLeod Consulting (UK) Ltd

7.4.2 A summary of the conclusions of the work are given in Tables 7.1 and 7.2 below.

Table 7.1: Site 3i

Issue	Summary
Conclusions	There are no potential contaminants currently being stored on site which are likely to give rise to environmental risks. The onsite Made Ground present is a potential historic source of contamination, particularly in regard to the 'slag' material noted during the site visit and also the former course of the Invergowrie Burn which was probably in-filled. The Invergowrie Burn remains a current and historic potential source of contamination due to the mills and industrial estate located upstream of the site.
Statutory Designation	It is considered highly unlikely that given the current and historical use of the site it would be classified as contaminated land by the local authority under Part 2A of the Environmental Protection Act 1990.
Residual Liability	Given the results of the risk assessment, it is considered unlikely that a residual liability for historic contamination would be realised at the site given its potential redevelopment as a Park and Ride facility. The construction of extensive areas of hardstanding would break the pathways between potential sources and receptors.
Financial Security	The site can be considered acceptable security for funding from an environmental risk standpoint given the continued use of the site
Recommendations	In the current context, we do not foresee the need for site investigation to assess the potential for contamination risks.

Table 7.2: Site 6b

Issue	Summary
Conclusions	There are no potential contaminants currently being stored on site which are likely to give rise to environmental risks. The on and off site waste deposits, Made Ground and groundwater are potential sources of contamination, albeit previous investigations have shown that there is only a low to very low risk to human and ecological receptors.
Statutory Designation	It is considered likely that given the historical use of the site it could be classified as contaminated land by the local authority under Part 2A of the Environmental Protection Act 1990.
Residual Liability	Given the results of the risk assessment, it is considered unlikely that a residual liability for historic contamination would be realised at the site given its potential redevelopment as a Park and Ride facility. The construction of extensive areas of hardstanding would break the pathways between potential sources and receptors.
Financial Security	The site can be considered acceptable security for funding from an environmental risk standpoint given the continued use of the site.
Recommendations	In the current context, we do not foresee the need for site investigation to assess the potential for contamination risks.

7.4.3 No significant issues were identified at Site 3i. Site 6b may be classified as contaminated land, however the provision of a Park & Ride would pose little risk. The provision of extensive hardstanding would cover any contamination and break pathways between sources of contamination and receptors.

7.5 Desktop utilities survey

7.5.1 A desk top utility survey has been undertaken. At Site 3i, relatively few utilities would be affected. There is a Cable and Wireless utility running along the north side of the A90 which

would be affected by the proposed off-slip. A local water main runs adjacent to the Dykes of Gray Road and there is a Virgin Media cable running to the Landmark Hotel.

7.5.2 Utilities have been summarised in Figure D.1 in Appendix D.

7.5.3 At Site 6b, a number of utilities may be affected by the proposed roundabout access on Riverside Avenue. The most important of these are on the north side of Riverside Avenue; they are:

- a waste water sewer, and
- a medium pressure gas main

7.5.4 British Telecom, electricity, water and Virgin Media utilities are also located close to the site. For clarity, each utility has been separately plotted in Appendix D.

Appendix A

Scheme layouts

Figure A.1: Site 3 layout

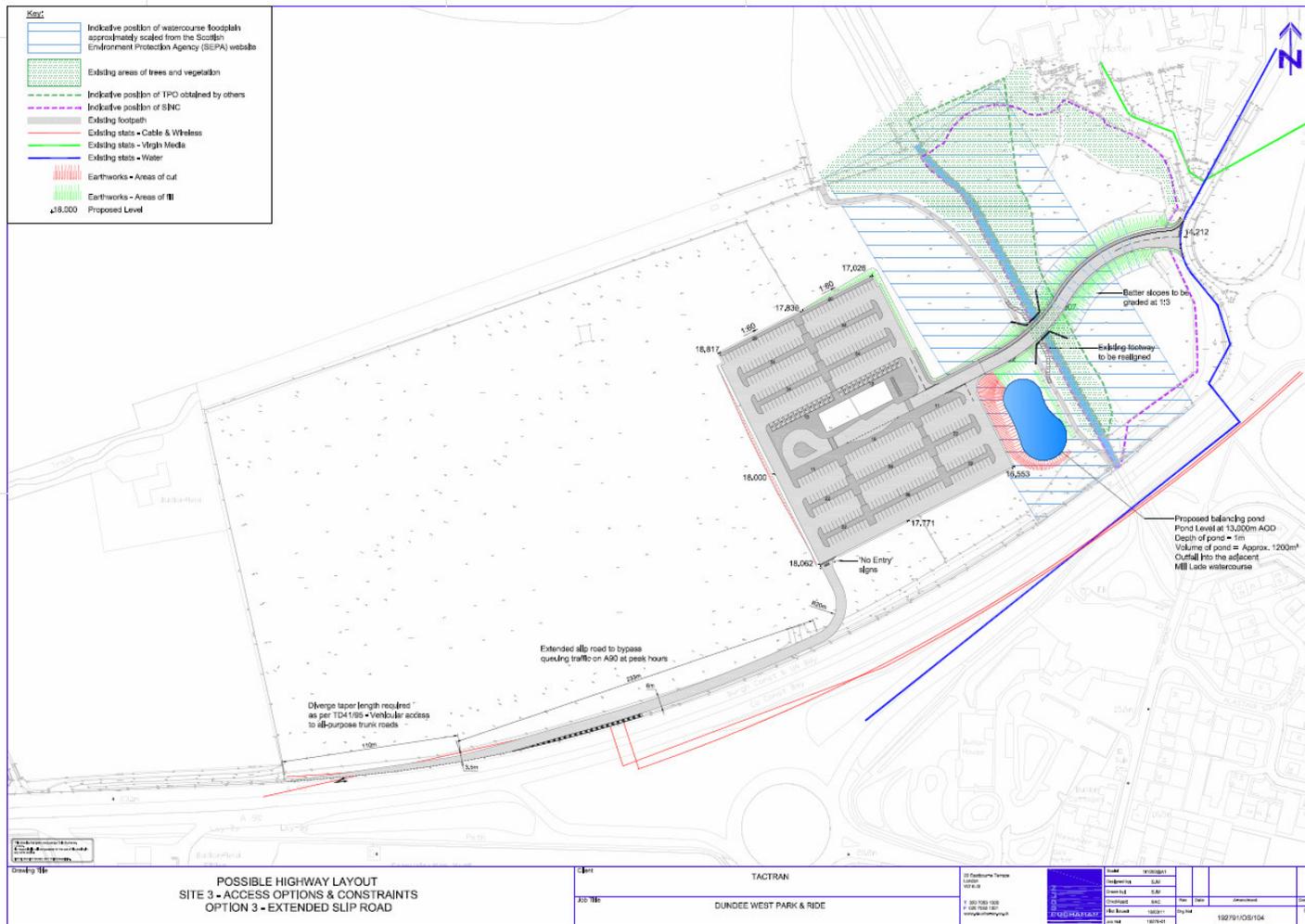
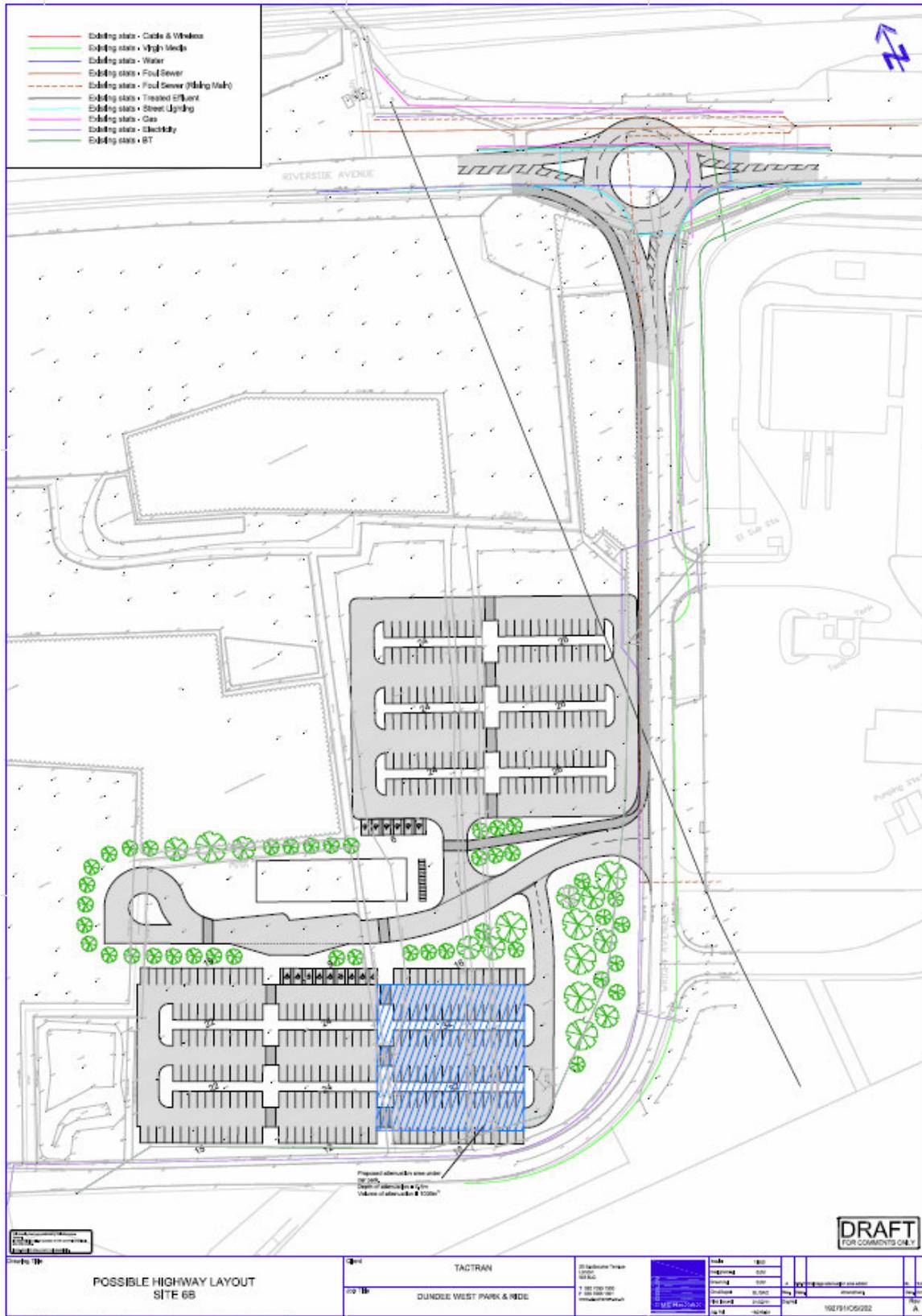


Figure A 3: Site 6b layout



Appendix B

Scheme costs

Site 3 – pavement design 1 (car only)

Car park	Quantity	Unit	Rate	Total
Site clearance		Allow	Sum	£4,900.00
Earthworks - class 5A	2,509	m3	£2.92	£7,326.28
Earthworks - acceptable excluding class 5A	3,339	m3	£5.55	£18,531.45
Earthworks - (off-site disposal)	334	m3	£2.13	£711.42
Earthworks (deposition of fill material gained on-site)	3,005	m3	£0.86	£2,584.30
Pavements - sub-base	2,473.4	m3	£32.80	£81,127.52
Pavements - base 150mm CRC	930	m2	£23.92	£22,245.60
Pavements - base 120mm AC	11,437	m2	£14.42	£164,921.54
Pavements - binder 60mm AC	12,367	m2	£8.44	£104,377.48
Pavements - surface coat 40mm AC	12,367	m2	£7.10	£87,805.70
Pavements - tack coat	12,367	m2	£0.62	£7,667.54
Drainage - pipes and pipe work	900	m	£100.00	£90,000.00
Drainage - chambers and connections	12	no.	£1,320.00	£15,840.00
Drainage - gullies and connections	50	no.	£450.00	£22,500.00
Kerbs HB2	2,384	m	£15.50	£36,952.00
Kerbs EF edging	780	m	£10.00	£7,800.00
Footways	4,359	m2	£25.00	£108,975.00
Fencing	575	m	£18.47	£10,620.25
Traffic signs and road markings		Allow	Sum	£4,800.00
Street lighting		Allow	Sum	£86,000.00
CCTV	12,367	m2	£5.10	£63,071.70
Shelter		Allow	Sum	£20,000.00
Real-time passenger information		Allow	Sum	£20,000.00
Electric car charging points	6	no.	£2,000.00	£12,000.00
Car park sub total				£1,000,757.78
Drainage and attenuation works				
Attenuation basin, manhole and pipeworks		Allow	Sum	£20,000.00
Drainage and attenuation works sub total				£20,000.00
Link road				
Site clearance		Allow	Sum	£1,000.00
Earthworks - class 5A	230	m3	£2.92	£671.60
Earthworks - acceptable excluding class 5A	107	m3	£5.55	£593.85
Earthworks - (off-site disposal)	10.7	m3	£2.13	£22.79
Earthworks (deposition of fill material gained on-site)	96.3	m3	£0.86	£82.82
Earthworks (embankments - imported fill 6F)	11,800	m3	£30.00	£354,000.00
Deposition and compaction of fill	11,800	m3	£1.21	£14,278.00
Pavements - sub-base	307	m3	£32.80	£10,063.04
Pavements - base 150mm AC	1,534	m2	£17.17	£26,338.78
Pavements - binder 60mm AC	1,534	m2	£8.44	£12,946.96
Pavements - surface coat 40mm AC	1,534	m2	£7.10	£10,891.40
Pavements - tack coat	1,534	m2	£0.62	£951.08
Drainage - pipes and pipe work	200	m	£100.00	£20,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	405.7	m	£15.50	£6,287.73
Kerbs EF edging	405.7	m	£10.00	£4,056.60
Footways	405.7	m2	£25.00	£10,141.50
Fencing	334	m	£18.47	£6,168.98
Traffic signs and road markings		Allow	Sum	£2,700.00
Street lighting		Allow	Sum	£23,000.00
Bridge		Allow	Sum	£407,925.00
Flood channels		Allow	Sum	£367,500.00
Link road sub total				£1,288,500.13
Slip road 2				
Site clearance		Allow	Sum	£2,800.00
Earthworks - class 5A	259	m3	£2.92	£756.28
Earthworks - acceptable excluding class 5A	518	m3	£5.55	£2,874.90
Earthworks - (off-site disposal)	51.8	m3	£2.13	£110.33
Pavements - sub-base	345.6	m3	£32.80	£11,335.68
Pavements - base 150mm AC	1,728	m2	£17.17	£29,669.76
Pavements - binder 60mm AC	1,728	m2	£8.44	£14,584.32
Pavements - surface coat 40mm AC	1,728	m2	£7.10	£12,268.80
Pavements - tack coat	1,728	m2	£0.62	£1,071.36
Drainage - pipes and pipe work	250	m	£100.00	£25,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	812.2	m	£15.50	£12,589.41
Fencing	390	m	£18.47	£7,203.30

Car park	Quantity	Unit	Rate	Total
Traffic signs and road markings		Allow	Sum	£1,700.00
Street lighting		Allow	Sum	£13,200.00
Slip road sub total				£144,044.14
Infrastructure costs sub total				£2,453,302.05
Other costs				
Allow contractors preliminaries			20%	£490,660.41
Traffic management			5%	£122,665.10
Contingencies			15%	£367,995.31
Site investigation		Allow	Sum	£20,000.00
Landscaping		Allow	Sum	£65,000.00
Design fees		Allow	5.5%	£161,917.94
Site supervision		Allow	2.0%	£58,879.25
Utilities - diversions and reinforcements		Allow	Sum	£100,000.00
Other costs sub total				£1,387,118.01
Grand total				£3,840,420.06
Grand total - contingencies				£3,472,424.75

Site 3 – pavement design 2 (including overnight HGV parking)

Car park	Quantity	Unit	Rate	Total
Site clearance		Allow	Sum	£4,900.00
Earthworks - class 5A	2,509	m3	£2.92	£7,326.28
Earthworks - acceptable excluding class 5A	3,547	m3	£5.55	£19,685.85
Earthworks - (off-site disposal)	355	m3	£2.13	£756.15
Earthworks (deposition of fill material gained on-site)	3,192	m3	£0.86	£2,745.12
Pavements - sub-base	2,473.4	m3	£32.80	£81,127.52
Pavements - base 150mm CRC	930	m2	£23.92	£22,245.60
Pavements - base 150mm AC	5,997	m2	£17.17	£102,968.49
Pavements - base 120mm AC	5,440	m2	£14.42	£78,444.80
Pavements - binder 60mm AC	12,367	m2	£8.44	£104,377.48
Pavements - surface coat 40mm AC	12,367	m2	£7.10	£87,805.70
Pavements - tack coat	12,367	m2	£0.62	£7,667.54
Drainage - pipes and pipe work	900	m	£100.00	£90,000.00
Drainage - chambers and connections	12	no.	£1,320.00	£15,840.00
Drainage - gullies and connections	50	no.	£450.00	£22,500.00
Kerbs HB2	2,384	m	£15.50	£36,952.00
Kerbs EF edging	780	m	£10.00	£7,800.00
Footways	4,359	m2	£25.00	£108,975.00
Fencing	575	m	£18.47	£10,620.25
Traffic signs and road markings		Allow	Sum	£4,800.00
Street lighting		Allow	Sum	£86,000.00
CCTV	12,367	m2	£5.10	£63,071.70
Shelter		Allow	Sum	£20,000.00
Real-time passenger information		Allow	Sum	£20,000.00
Electric car charging points	6	no.	£2,000.00	£12,000.00
Car park sub total				£1,018,609.48
Drainage and attenuation works				
Attenuation basin, manhole and pipeworks		Allow	Sum	£20,000.00
Drainage and attenuation works sub total				£20,000.00
Link road				
Site clearance		Allow	Sum	£1,000.00
Earthworks - class 5A	230	m3	£2.92	£671.60
Earthworks - acceptable excluding class 5A	107	m3	£5.55	£593.85
Earthworks - (off-site disposal)	10.7	m3	£2.13	£22.79
Earthworks (deposition of fill material gained on-site)	96.3	m3	£0.86	£82.82
Earthworks (embankments - imported fill 6F)	11,800	m3	£30.00	£354,000.00
Deposition and compaction of fill	11,800	m3	£1.21	£14,278.00
Pavements - sub-base	307	m3	£32.80	£10,063.04
Pavements - base 150mm AC	1,534	m2	£17.17	£26,338.78
Pavements - binder 60mm AC	1,534	m2	£8.44	£12,946.96
Pavements - surface coat 40mm AC	1,534	m2	£7.10	£10,891.40
Pavements - tack coat	1,534	m2	£0.62	£951.08
Drainage - pipes and pipe work	200	m	£100.00	£20,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	405.7	m	£15.50	£6,287.73
Kerbs EF edging	405.7	m	£10.00	£4,056.60
Footways	405.7	m2	£25.00	£10,141.50
Fencing	334	m	£18.47	£6,168.98
Traffic signs and road markings		Allow	Sum	£2,700.00
Street lighting		Allow	Sum	£23,000.00
Bridge		Allow	Sum	£407,925.00
Flood channels		Allow	Sum	£367,500.00
Link road sub total				£1,288,500.13
Slip road 2				
Site clearance		Allow	Sum	£2,800.00
Earthworks - class 5A	259	m3	£2.92	£756.28
Earthworks - acceptable excluding class 5A	518	m3	£5.55	£2,874.90
Earthworks - (off-site disposal)	51.8	m3	£2.13	£110.33
Pavements - sub-base	345.6	m3	£32.80	£11,335.68
Pavements - base 150mm AC	1,728	m2	£17.17	£29,669.76
Pavements - binder 60mm AC	1,728	m2	£8.44	£14,584.32
Pavements - surface coat 40mm AC	1,728	m2	£7.10	£12,268.80
Pavements - tack coat	1,728	m2	£0.62	£1,071.36
Drainage - pipes and pipe work	250	m	£100.00	£25,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	812.2	m	£15.50	£12,589.41

Car park	Quantity	Unit	Rate	Total
Fencing	390	m	£18.47	£7,203.30
Traffic signs and road markings		Allow	Sum	£1,700.00
Street lighting		Allow	Sum	£13,200.00
Slip road sub total				£144,044.14
Infrastructure costs sub total				£2,471,153.75
Other costs				
Allow contractors preliminaries			20%	£494,230.75
Traffic management			5%	£123,557.69
Contingencies			15%	£370,673.06
Site investigation		Allow	Sum	£20,000.00
Landscaping		Allow	Sum	£65,000.00
Design fees		Allow	5.5%	£163,096.15
Site supervision		Allow	2.0%	£59,307.69
Utilities - diversions and reinforcements		Allow	Sum	£100,000.00
Other costs sub total				£1,395,865.34
Grand total				£3,867,019.09
Grand total - contingencies				£3,496,346.03

Site 3 – lay-by

Car park	Total
SERIES 200: Site clearance	£4,700
SERIES 500: Drainage and service ducts	£4,700
SERIES 600: Earthworks	£23,300
SERIES 700: Pavements	£64,200
SERIES 1100: Kerbs, footways and paved areas	£15,100
SERIES 1200: Traffic signs and road markings	£1,900
SERIES 1300: Road lighting columns and brackets, CCTV masts and cantilever masts	£3,200
SERIES 1400: Electrical work for road lighting and traffic signs	£3,900
Slip road sub total	£121,000
Contractors preliminaries (20%)	£24,200
Traffic management (20%)	£24,200
Contingencies (15%)	£18,150
Design fees (5.5%)	£7,986
Site supervision (2%)	£2,904
Utilities - diversions and reinforcements	£20,000
Grand total	£218,440
Grand total - contingencies	£200,290

Site 6b – pavement design 1 (car only)

Car park	Quantity	Unit	Rate	Total
Site clearance		Allow	Sum	£4,900.00
Earthworks - class 5A	6,416	m3	£2.92	£18,734.72
Earthworks - acceptable excluding class 5A	8,102	m3	£5.55	£44,966.10
Earthworks - (off-site disposal)	810	m3	£2.13	£1,725.30
Earthworks (deposition of fill material gained on-site)	7,292	m3	£0.86	£6,271.12
Earthworks (imported fill 6F)	7,789	m3	£30.00	£233,670.00
Deposition and compaction of fill	7,789	m3	£1.21	£9,424.69
Pavements - sub-base	2,596.4	m3	£32.80	£85,161.92
Pavements - base 150mm CRC	1,040	m2	£23.92	£24,876.80
Pavements - base 150mm AC	739	m2	£17.17	£12,688.63
Pavements - base 120mm AC	11,203	m2	£14.42	£161,547.26
Pavements - binder 60mm AC	12,982	m2	£8.44	£109,568.08
Pavements - surface coat 40mm AC	12,982	m2	£7.10	£92,172.20
Pavements - tack coat	12,982	m2	£0.62	£8,048.84
Drainage - pipes and pipe work	1,020	m	£100.00	£102,000.00
Drainage - chambers and connections	12	no.	£1,320.00	£15,840.00
Drainage - gullies and connections	55	no.	£450.00	£24,750.00
Kerbs HB2	1,887	m	£15.50	£29,248.50
Kerbs EF edging	180	m	£10.00	£1,800.00
Footways	3,058	m2	£25.00	£76,450.00
Fencing	700	m	£18.47	£12,929.00
Traffic signs and road markings		Allow	Sum	£4,800.00
Street lighting		Allow	Sum	£86,000.00
CCTV	15,301	m2	£5.10	£78,035.10
Shelter		Allow	Sum	£20,000.00
Real-time passenger information		Allow	Sum	£20,000.00
Electric car charging points	6	no.	£2,000.00	£12,000.00
Car park sub total				£1,297,608.26
Drainage and attenuation works				
Attenuation basin, manhole and pipeworks		Allow	Sum	£20,000.00
Drainage and attenuation works sub total				£20,000.00
Footways				
Site clearance		Allow	Sum	£1,800.00
Earthworks	230	m3	£2.92	£2,000.00
Kerbs HB2	230.0	m	£15.50	£3,565.00
Kerbs EF edging	310.0	m	£10.00	£3,100.00
Footways	802.0	m2	£25.00	£20,050.00
Street lighting		Allow	Sum	£23,000.00
Link road sub total				£53,515.00
Roundabout				
Site clearance		Allow	Sum	£5,000.00
Earthworks - class 5A	252	m3	£2.92	£735.84
Earthworks - acceptable excluding class 5A	409	m3	£5.55	£2,269.95
Earthworks - (off-site disposal)	41.0	m3	£2.13	£87.33
Earthworks (deposition of fill material gained on-site)	368	m3	£0.86	£316.48
Earthworks (imported fill 6F)	377	m3	£30.00	£11,310.00
Deposition and compaction of fill	377	m3	£1.21	£456.17
Pavements - sub-base	126.0	m3	£32.80	£4,132.80
Pavements - base 150mm AC	629	m2	£17.17	£10,799.93
Pavements - binder 60mm AC	2,195	m2	£8.44	£18,525.80
Pavements - surface coat 40mm AC	2,195	m2	£7.10	£15,584.50
Pavements - tack coat	2,195	m2	£0.62	£1,360.90
Cold milling	1,566	m2	£5.40	£8,456.40
Drainage - pipes and pipe work	150	m	£100.00	£15,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	324.0	m	£15.50	£5,022.00
Traffic signs and road markings		Allow	Sum	£7,500.00
Street lighting		Allow	Sum	£30,000.00
Landscaping		Allow	Sum	£6,000.00
Slip road sub total				£151,438.10
Infrastructure costs sub total				£1,522,561.36
Other costs				
Allow contractors preliminaries			20%	£304,512.27
Traffic management			5%	£76,128.07
Contingencies			15%	£228,384.20

Car park	Quantity	Unit	Rate	Total
Site investigation		Allow	Sum	£20,000.00
Landscaping		Allow	Sum	£65,000.00
Design fees		Allow	5.5%	£100,489.05
Site supervision		Allow	2.0%	£36,541.47
Utilities - diversions and reinforcements		Allow	Sum	£100,000.00
Other costs sub total				£931,055.07
Grand total				£2,453,616.43
Grand total - contingencies				£2,225,232.22

Site 6b – pavement design 2 (including overnight HGV parking)

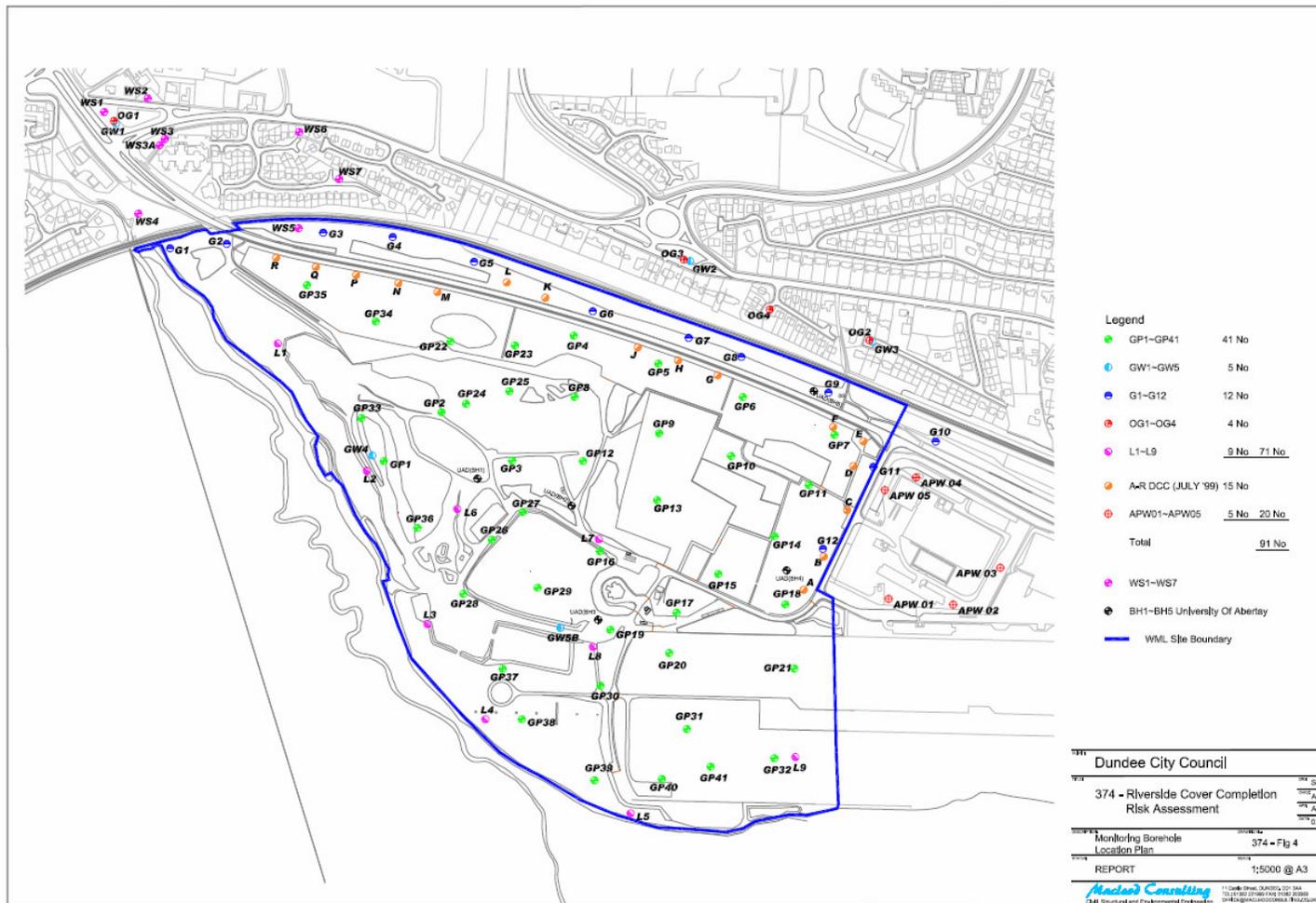
Car park	Quantity	Unit	Rate	Total
Site clearance		Allow	Sum	£4,900.00
Earthworks - class 5A	6,416	m3	£2.92	£18,734.72
Earthworks - acceptable excluding class 5A	8,262	m3	£5.55	£45,854.10
Earthworks - (off-site disposal)	826	m3	£2.13	£1,759.38
Earthworks (deposition of fill material gained on-site)	7,436	m3	£0.86	£6,394.96
Earthworks (imported fill 6F)	7,789	m3	£30.00	£233,670.00
Deposition and compaction of fill	7,789	m3	£1.21	£9,424.69
Pavements - sub-base	2,596.4	m3	£32.80	£85,161.92
Pavements - base 150mm CRC	1,040	m2	£23.92	£24,876.80
Pavements - base 150mm AC	7,128	m2	£17.17	£122,387.76
Pavements - base 120mm AC	5,854	m2	£14.42	£84,414.68
Pavements - binder 60mm AC	12,982	m2	£8.44	£109,568.08
Pavements - surface coat 40mm AC	12,982	m2	£7.10	£92,172.20
Pavements - tack coat	12,982	m2	£0.62	£8,048.84
Drainage - pipes and pipe work	1,020	m	£100.00	£102,000.00
Drainage - chambers and connections	12	no.	£1,320.00	£15,840.00
Drainage - gullies and connections	55	no.	£450.00	£24,750.00
Kerbs HB2	1,887	m	£15.50	£29,248.50
Kerbs EF edging	180	m	£10.00	£1,800.00
Footways	3,058	m2	£25.00	£76,450.00
Fencing	700	m	£18.47	£12,929.00
Traffic signs and road markings		Allow	Sum	£4,800.00
Street lighting		Allow	Sum	£86,000.00
CCTV	15,301	m2	£5.10	£78,035.10
Shelter		Allow	Sum	£20,000.00
Real-time passenger information		Allow	Sum	£20,000.00
Electric car charging points	6	no.	£2,000.00	£12,000.00
Car park sub total				£1,331,220.73
Drainage and attenuation works				
Attenuation basin, manhole and pipeworks		Allow	Sum	£20,000.00
Drainage and attenuation works sub total				£20,000.00
Footways				
Site clearance		Allow	Sum	£1,800.00
Earthworks	230	m3	£2.92	£2,000.00
Kerbs HB2	230.0	m	£15.50	£3,565.00
Kerbs EF edging	310.0	m	£10.00	£3,100.00
Footways	802.0	m2	£25.00	£20,050.00
Street lighting		Allow	Sum	£23,000.00
Link road sub total				£53,515.00
Roundabout				
Site clearance		Allow	Sum	£5,000.00
Earthworks - class 5A	252	m3	£2.92	£735.84
Earthworks - acceptable excluding class 5A	409	m3	£5.55	£2,269.95
Earthworks - (off-site disposal)	41.0	m3	£2.13	£87.33
Earthworks (deposition of fill material gained on-site)	368	m3	£0.86	£316.48
Earthworks (imported fill 6F)	377	m3	£30.00	£11,310.00
Deposition and compaction of fill	377	m3	£1.21	£456.17
Pavements - sub-base	126.0	m3	£32.80	£4,132.80
Pavements - base 150mm AC	629	m2	£17.17	£10,799.93
Pavements - binder 60mm AC	2,195	m2	£8.44	£18,525.80
Pavements - surface coat 40mm AC	2,195	m2	£7.10	£15,584.50
Pavements - tack coat	2,195	m2	£0.62	£1,360.90
Cold milling	1,566	m2	£5.40	£8,456.40
Drainage - pipes and pipe work	150	m	£100.00	£15,000.00
Drainage - chambers and connections	4	no.	£1,320.00	£5,280.00
Drainage - gullies and connections	8	no.	£450.00	£3,600.00
Kerbs HB2	324.0	m	£15.50	£5,022.00
Traffic signs and road markings		Allow	Sum	£7,500.00
Street lighting		Allow	Sum	£30,000.00
Landscaping		Allow	Sum	£6,000.00
Slip road sub total				£151,438.10
Infrastructure costs sub total				£1,556,173.83
Other costs				
Allow contractors preliminaries			20%	£311,234.77
Traffic management			5%	£77,808.69
Contingencies			15%	£233,426.07

Car park	Quantity	Unit	Rate	Total
Site investigation		Allow	Sum	£20,000.00
Landscaping		Allow	Sum	£65,000.00
Design fees		Allow	5.5%	£102,707.47
Site supervision		Allow	2.0%	£37,348.17
Utilities - diversions and reinforcements		Allow	Sum	£100,000.00
Other costs sub total				£947,525.18
Grand total				£2,503,699.01
Grand total - contingencies				£2,270,272.93

Appendix C

Topographical survey / ground investigation trial pit locations

Figure C.7.3: Site 6b – ground investigation trial pit locations



Appendix D

Desktop utilities survey

Figure D.1: Site 3i – utilities in vicinity of site

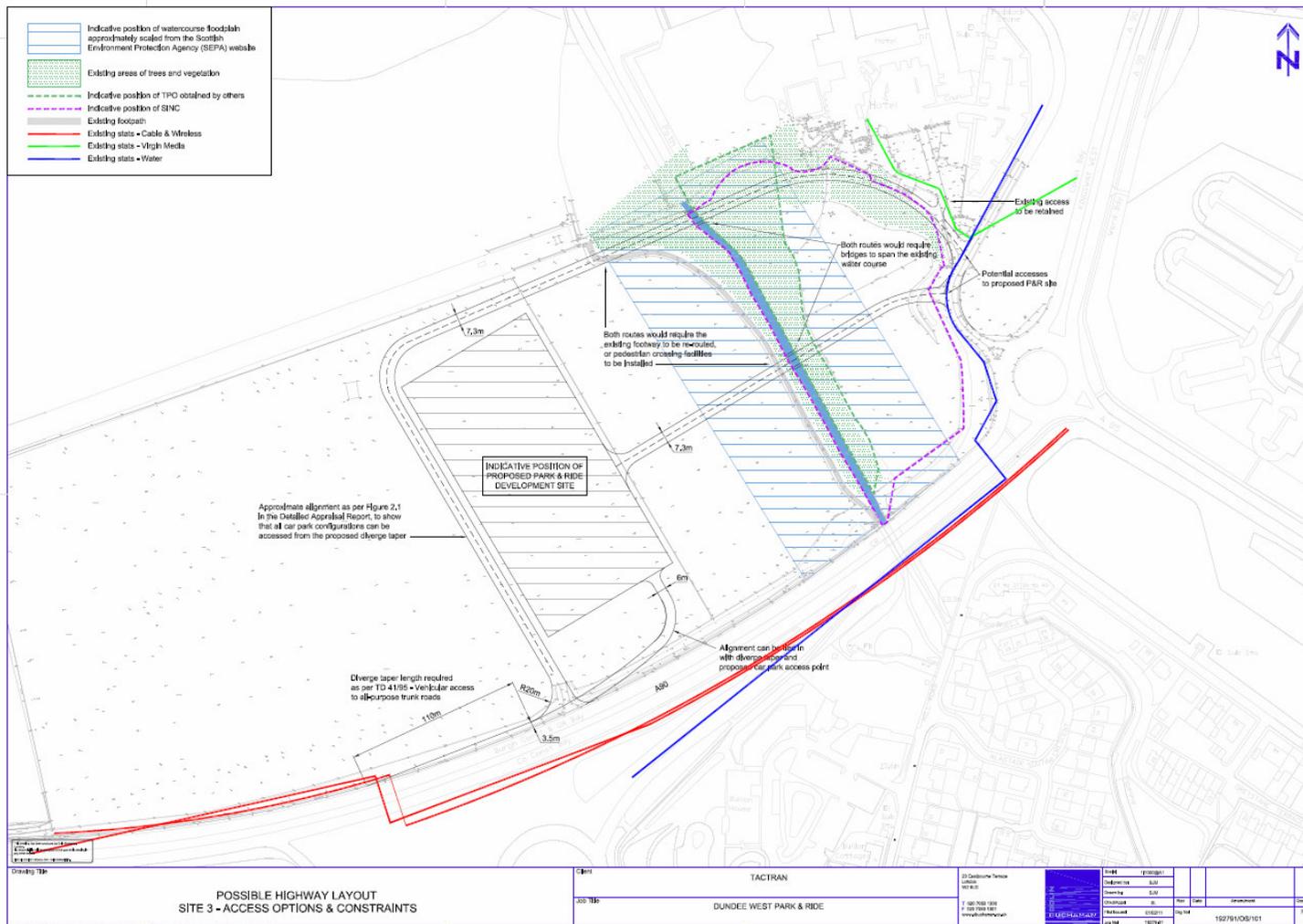


Figure D.2: Site 6b – waste water utilities

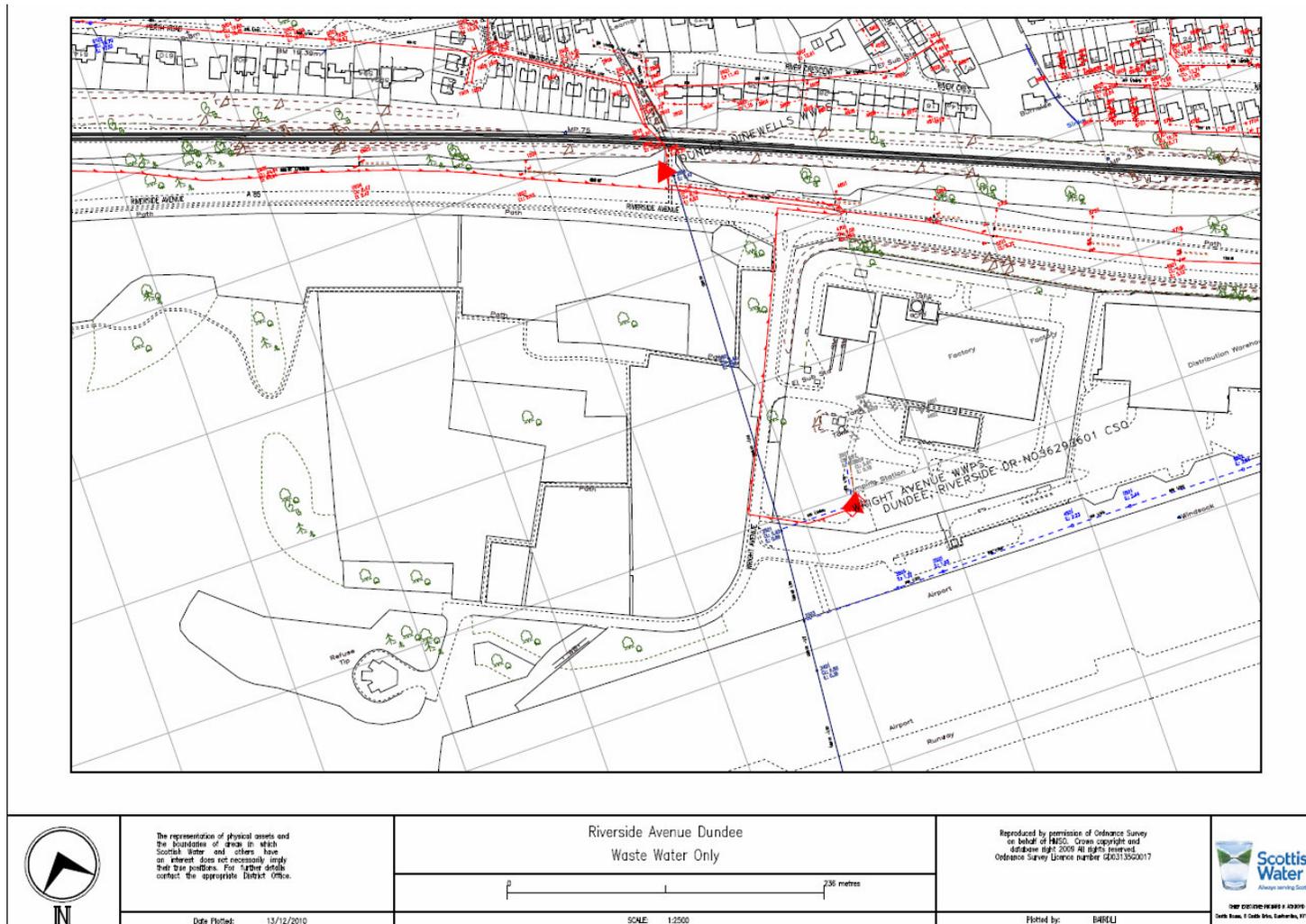


Figure D.3: Site 6b – medium pressure gas main

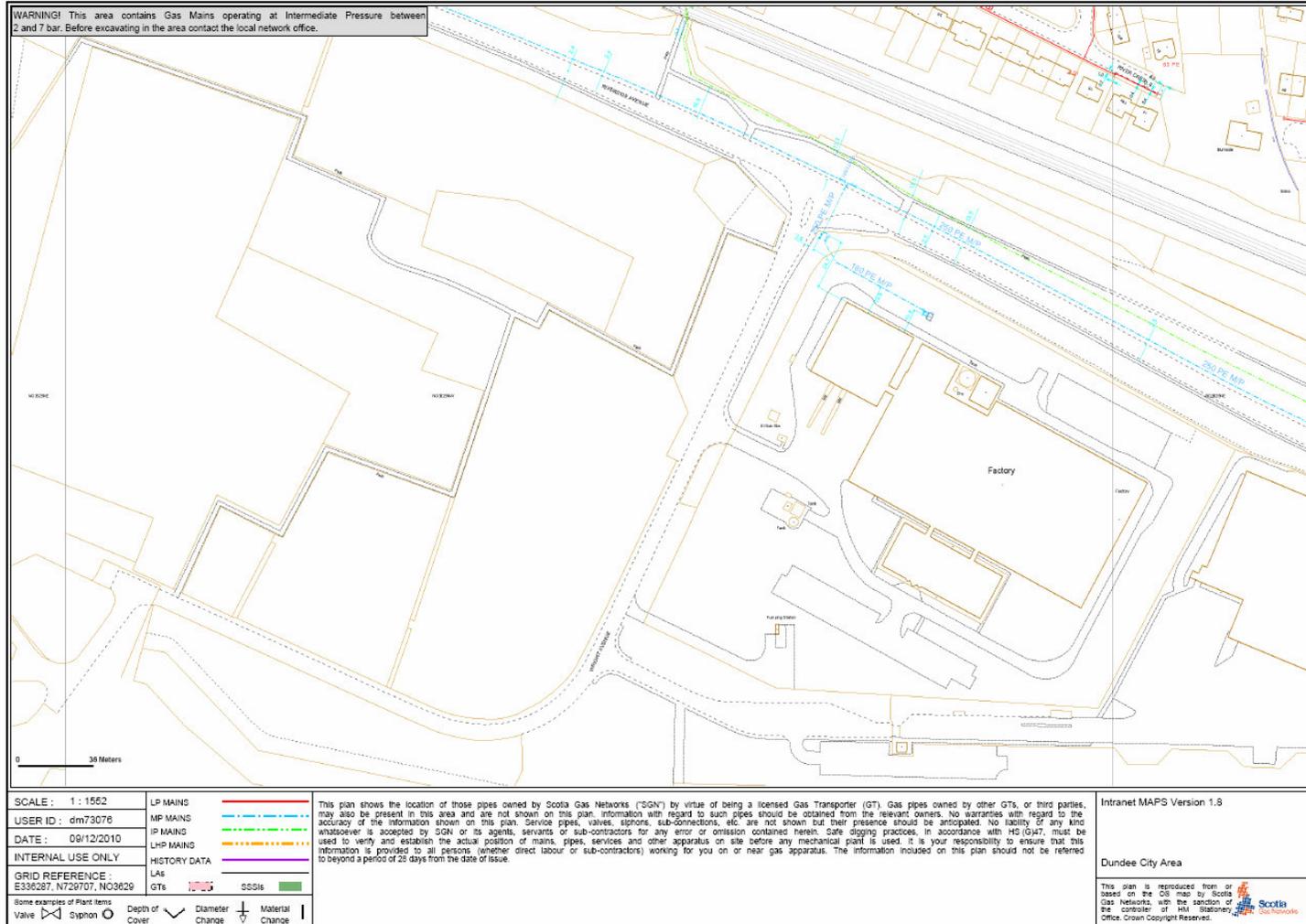
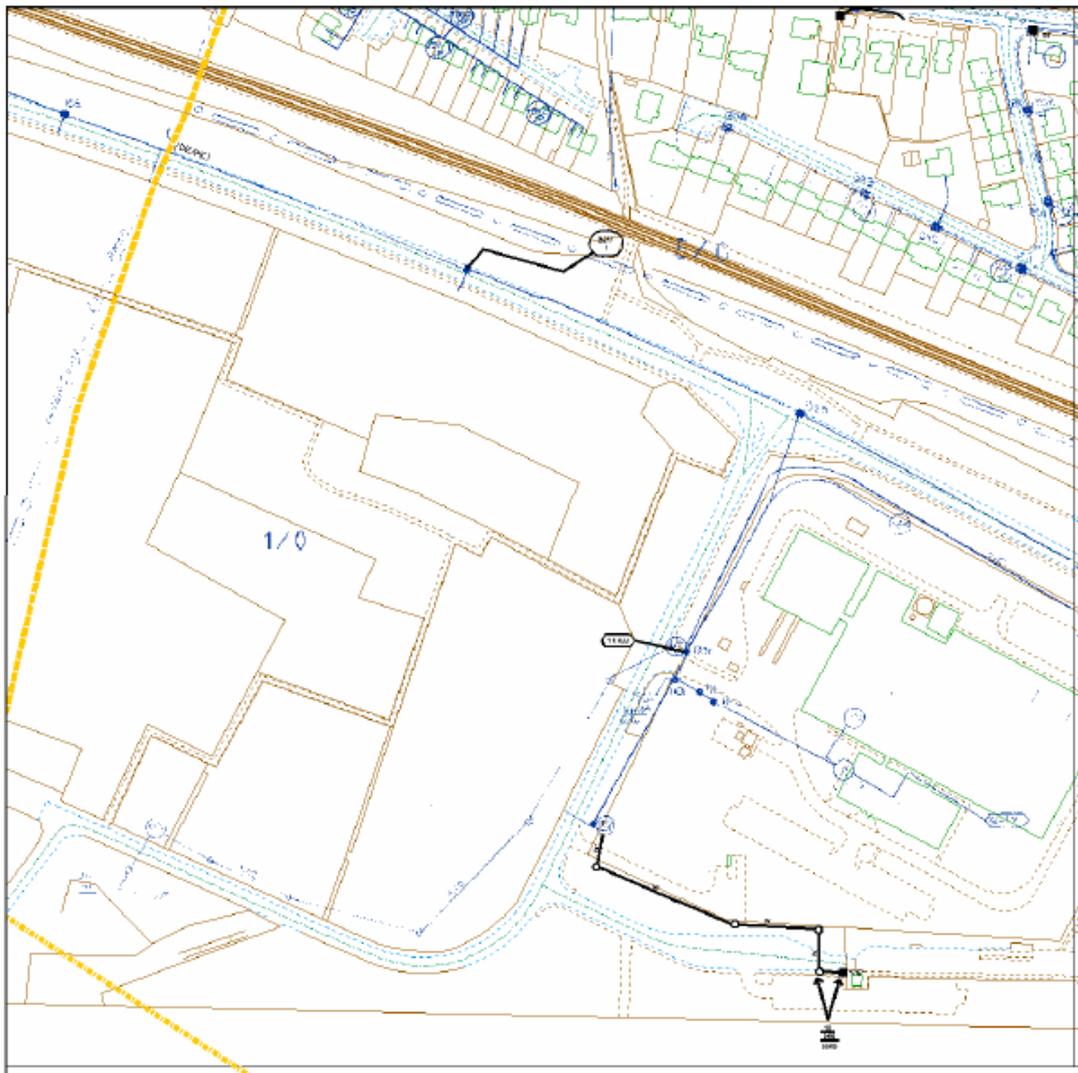


Figure D.4: Site 6b – British Telecom utilities



<p>IMPORTANT WARNING</p> <p>Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.</p>	<p>KEY TO BT SYMBOLS</p> <table border="0"> <tr> <td></td> <td>UNDERGROUND PLANT</td> <td></td> <td>POLE</td> </tr> <tr> <td></td> <td>OVERHEAD PLANT</td> <td></td> <td>CABINET</td> </tr> <tr> <td></td> <td>JOINT BOX</td> <td></td> <td>BURIED JOINT</td> </tr> <tr> <td></td> <td>DISTRIBUTION POINT</td> <td></td> <td>JOINTING POST</td> </tr> <tr> <td></td> <td>MANHOLE</td> <td></td> <td>PROPOSED U/G</td> </tr> <tr> <td></td> <td>DP BOUNDARY</td> <td></td> <td>PROPOSED O/H</td> </tr> <tr> <td></td> <td>OTHER BT BOUNDARY</td> <td></td> <td>PROPOSED BOX</td> </tr> </table> <p>Other proposed plant is shown using dashed lines. BT symbols not listed above may be disregarded. Existing BT plant may not be recorded. Information valid at the time of preparation.</p>		UNDERGROUND PLANT		POLE		OVERHEAD PLANT		CABINET		JOINT BOX		BURIED JOINT		DISTRIBUTION POINT		JOINTING POST		MANHOLE		PROPOSED U/G		DP BOUNDARY		PROPOSED O/H		OTHER BT BOUNDARY		PROPOSED BOX
	UNDERGROUND PLANT		POLE																										
	OVERHEAD PLANT		CABINET																										
	JOINT BOX		BURIED JOINT																										
	DISTRIBUTION POINT		JOINTING POST																										
	MANHOLE		PROPOSED U/G																										
	DP BOUNDARY		PROPOSED O/H																										
	OTHER BT BOUNDARY		PROPOSED BOX																										
<p>DIAL BEFORE YOU DIG</p> <p>FOR PROFESSIONAL ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS</p> <p>ADVANCE NOTICE REQUIRED (Office hours: Monday-Friday 08.00 to 17.00)</p> <p>Tel: 0800 9173093 E-mail: dbyd@openreach.co.uk Website: www.dialbeforeyoudig.com</p>	<p>BT ref: SUB10329C</p> <p>Map reference (centre): NO3625729744</p> <p>Issued: 07/12/10 10:40:38</p>																												
<p>Reproduced from the Ordnance Survey map by BT by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office (C) Crown Copyright British Telecommunications plc 100028040</p> <p>openreach a BT Group business</p>																													

Figure D.5: Site 6b – electricity utilities

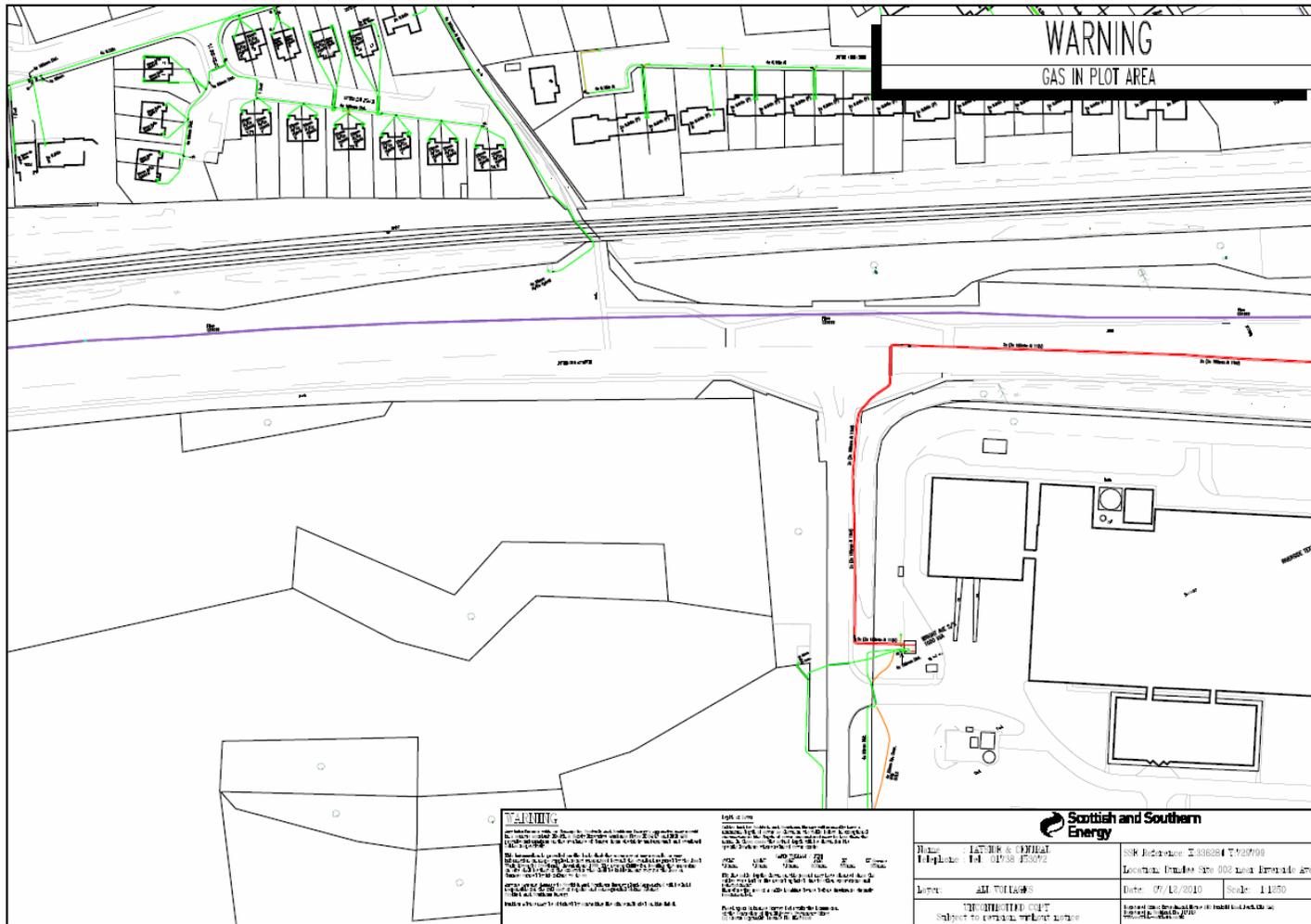


Figure D.7: Site 6b – water utilities

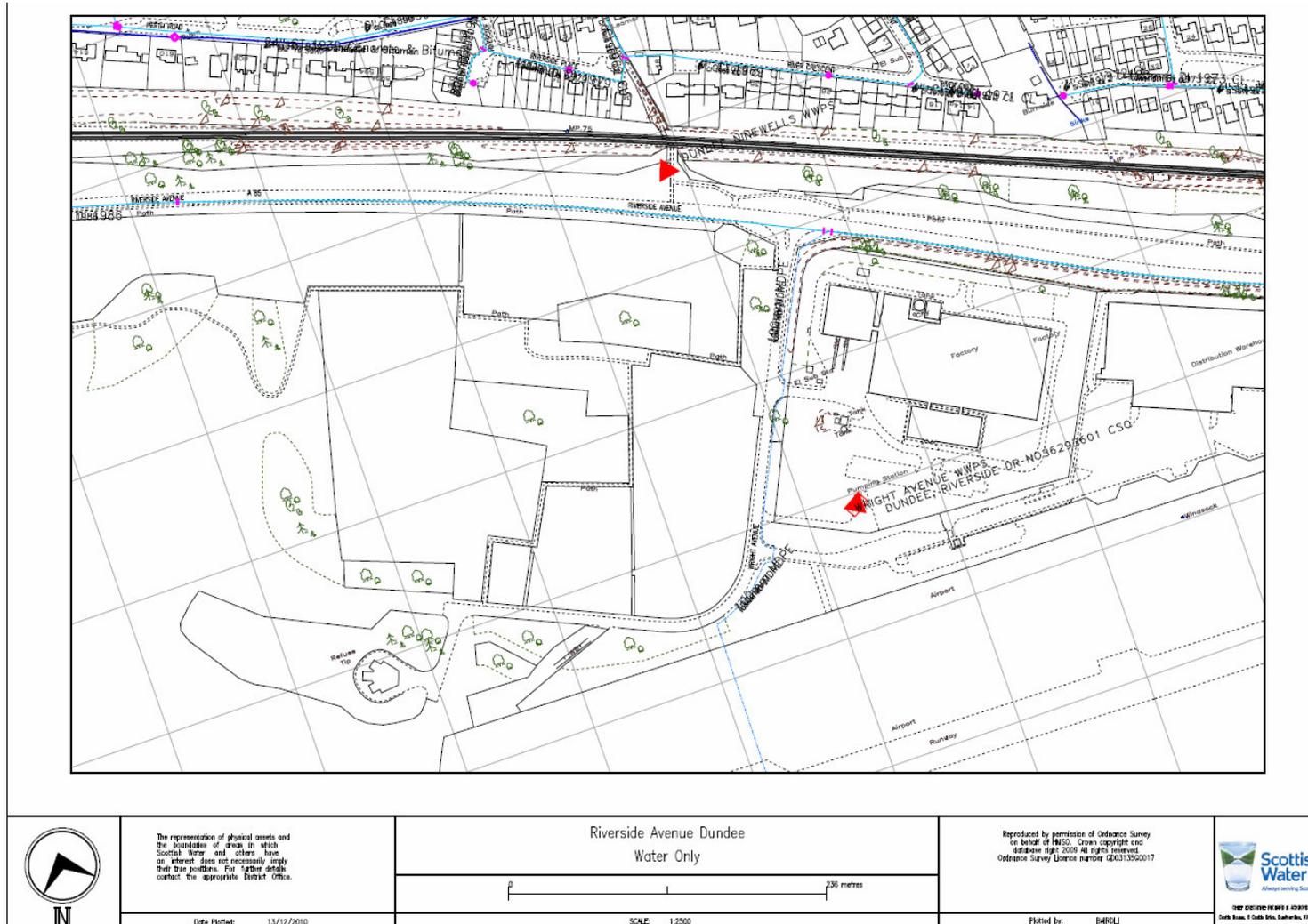
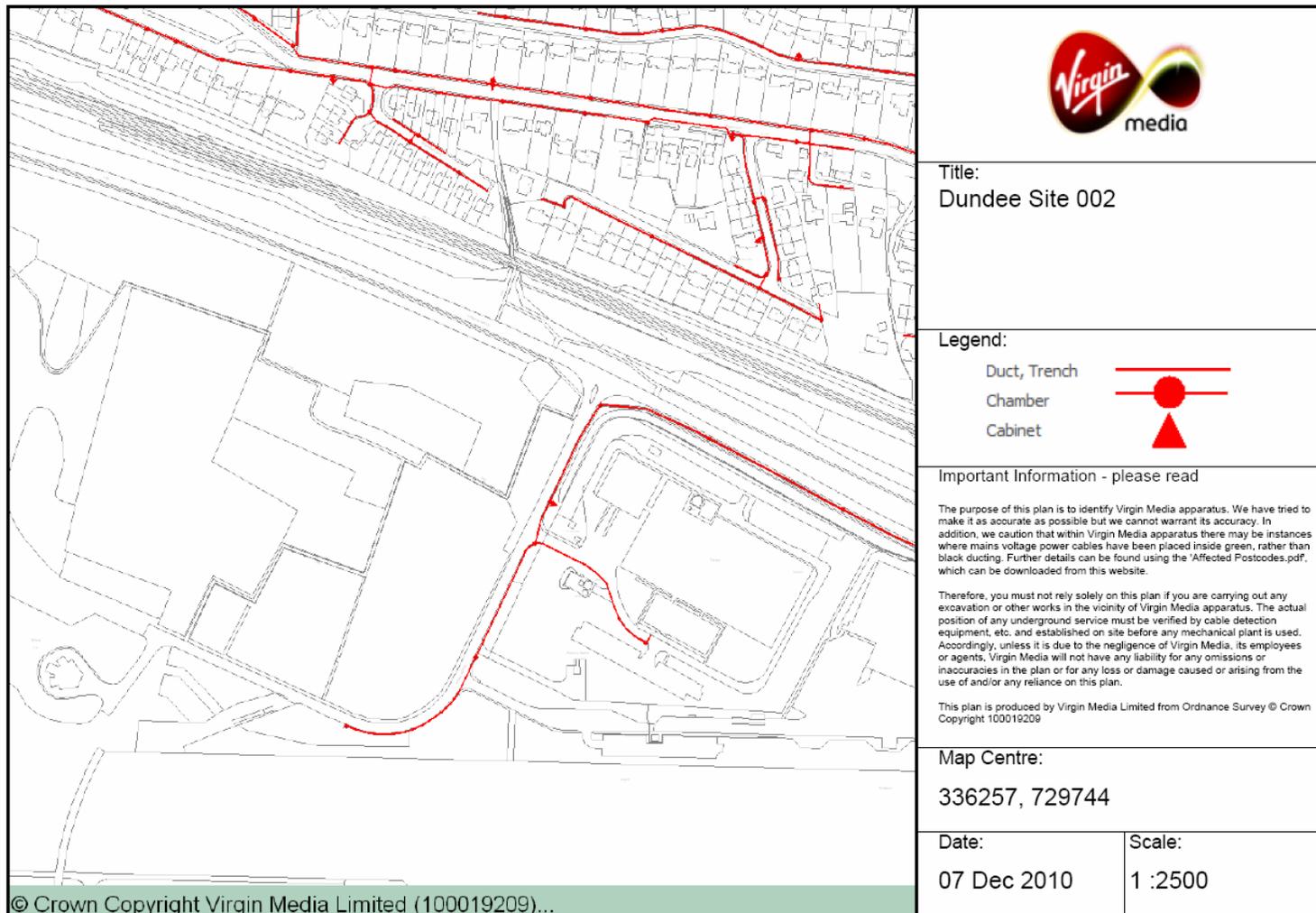


Figure D.8: Site 6b – Virgin Media utilities



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