



A18-A180 Link Road

Review of Scheme Costs

Report



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1 Introduction

A review of the scheme costs produced by OPUS has been undertaken. The construction costs which were the subject of the review are given in **Appendix A**. A limited check of quantities was undertaken as the scheme plans do not provide sufficient detail to check all of the items. The rates were checked against rates given in SPON'S 2008¹.

¹ SPON's Civil Engineering and Highway Works Price Book, 2008

2 Construction Costs Review

Review of Bill of Quantities

Drainage and Service Ducts

- 2.1 SPON'S 2008 does not provide rates for Drainage and Service Ducts, therefore these rates cannot be checked.
- 2.2 The length of ditching (item 23a) has been estimated at 1725m from the scheme drawings compared with 3,000m in the bill of quantities. This would give a cost saving of £12,750.

Earthworks

- 2.3 Some of the rates used for earthworks appear high. SPON'S gives a maximum value of £2 per m³ for deposition of fill whereas rates of £7.50 per m³ and £8.50 per m³ (items 30 and 31 respectively) have been used.
- 2.4 The rate used for imported acceptable fill (item 29) appears low. The lowest rate SPON'S gives is £14.59 per m³ including aggregate tax for reclaimed quarry waste. These can go up to £36.72 per m³ depending on what material is used. Therefore, it is recommended that this is increased to £25 per m³.
- 2.5 The amount of material excavated and imported does not balance with the amount of material deposition plus material disposed. The volume of material required for the embankments has been calculated using the cross sections. This gives a volume of material required of around 41,000 m³. Item 29, imported acceptable fill material, equates to 41,000 m³, however, there is 7,500 m³ of acceptable material excavated. Therefore, only 33,500 m³ of material needs to be imported.
- 2.6 We would expect the deposition of acceptable fill material and compaction of fill material to equate to the imported acceptable fill plus the excavation of acceptable material, i.e. 41,000 m³ rather than 12,500 m³ given in the bill of quantities.
- 2.7 The plans do not show the extent of the area from which top soil needs stripping (item 28). Assuming the worst case that top soil needs stripping from the full area of the works, the quantity needs to be doubled.
- 2.8 The excavation for channels (item 26) appears low. It assumed that the length of excavation is the same as for the ditching (item 23a). The cross sectional area of the channel has been estimated from the cross sections. This gives a volume to be excavated to be estimated at 2,590 m³, which is greater than the 1,500 m³ given in the bill of quantities.
- 2.9 The rates for disposal depends upon how far the material has to be taken to be disposed of. The rates given appear to assume that the material has to be taken around 10kms.
- 2.10 Revised quantities and rates for the earthworks are given in **Table 2.1** compared with the original cost estimate in the last column. This shows that the Earthworks should increase by £305,600.

Table 2.1 Costs for Earthworks

Item		Unit	Revised Qty	Revised Rate	Revised Total	Original Total
	Excavation					
24	Excavation of acceptable material	m3	7,500	10.00	75,000	75,000
25	Excavation of hard material	m3	200	40.00	8,000	8,000
26	Excavation for channels	m3	2,590	9.50	24,605	14,250
27	Excavation for ponds	m3	7,600	9.50	72,200	72,200
28	Excavation (stripping of topsoil – 200mm thick)	m3	10,000	9.50	47,500	47,500
	Deposition of Fill					
29	Imported acceptable fill	m3	33,500	25.00	837,500	410,000
30	Deposition of stripped topsoil	m3	10,000	2.00	20,000	37,500
31	Deposition of acceptable material	m3	41,000	2.00	82,000	106,250
32	Compaction of fill	m3	41,000	0.79	32,390	37,500
33	Capping	m3	5,200	28.00	5,200	145,600
	Disposal					
34	Disposal of hard material	m3	200	10.00	2,000	2,000
35	Disposal of material	m3	7,750	8.00	62,000	62,000
	Geotextile					
36	Geotextile reinforcement	m2	100,000	2.50	250,000	250,000
Total					1,573,395	1,267,800

Pavements

- 2.11 For item 39, SPON'S 2008 gives a rate of £22.92/m² whereas a rate of £35/m² has been used. Also, the quantity used for item 40 appears high, assuming that this should equate to 10800m² multiplied by 0.225 giving 2,430m³. This would give a total cost saving of £147,439.

Electrical Works for Road Lighting and Traffic Signals

- 2.12 The rate appears high but a lower rate would have little impact on the overall scheme cost.

Additional Cost Items

- 2.13 Initial discussions with Network Rail have indicated that the cost for upgrading the level crossing would be £1.7m. This is £0.7m more than the estimate included in the original cost estimates. It has been agreed with Network Rail that the level crossing will be upgraded as a matter of course, therefore it should no longer form part of the scheme costs.
- 2.14 The original scheme costs also did not include for complementary improvement works to the B1210/A1173 and on Pelham Road. An allowance of £177,500 has been made for these elements of work. Also, the original cost estimates did not include for STATS diversions. An allowance of £45,000 has been made for such works.
- 2.15 The original estimates did not allow for land purchase. Agricultural land values can vary between £4,000 and £14,000 per hectare of land depending on the quality of the land. The average land value of £10,000 per hectare has been used for the base cost estimate. It has been calculated

from the initial scheme drawings that 6.05 Ha of land will be required, therefore the cost of land purchase equates to £60,500.

Optimism Bias

- 2.16 Optimism Bias should not be included in the base costs. This gives a cost saving of £1,890,638.

Contingency

- 2.17 A risk workshop was held in May 2008 in order to identify all of the risks associated with the scheme and to derive a quantified contingency. These risks have been reviewed throughout the development of the scheme. The risks were run through the @RISK software which derived a most likely cost risk of £2.02m which represents a 55% uplift to the construction costs.

Total Construction Cost

- 2.18 **Appendix B** shows a revised breakdown of the scheme costs. Taking all of the above into account, the base scheme cost should be £5,778,211.40. This compares to £6,187,544 including optimism bias, and £4,196,905 excluding optimism bias as shown in the original scheme cost calculations in **Appendix A**.

Total Scheme Costs

Original Estimate

- 2.19 **Table 2.2** shows the other elements of scheme costs which were assumed. These include:
- Major Scheme Business Case Submission – These should not be included as costs as within Major Scheme guidance² before Programme Entry are at risk to the local authority;
 - Detail Surveys and preliminary design (2% of works costs);
 - Planning and Orders processes (3% of works costs);
 - Detail Design (4.5% of works costs);
 - Tendering process (0.6% of works costs);
 - Site Supervision (3% of works costs).
- 2.20 The original scheme costs included additional items which amount to £815,000, excluding the MSBC submission which equates to around 13% of the works costs (£6.2m). Also, the works costs in **Table 2.2** include Optimisim Bias, therefore, the amount for additional items is over estimated.

² Guidance for Local Authorities seeking Government funding for major transport schemes: Main document, DfT, 2007

Table 2.2 Original Scheme Costs taken from RTB Scheme Evidence

Project Element	Timing	NELC Project Management, detailed surveys and Public Inquiry processes	Scheme Development, Detailed Design and Construction Management	Works Cost	TOTALS
Major Business Case Submission	2007	£10,000	£40,000		£50,000
Detail surveys and Preliminary design	Year 1	£10,000 £30,000	£90,000		£130,000
Planning and Orders processes	Year 1 and Year 2	£30,000	£150,000		£180,000
Detail design	Year 2	£10,000	£270,000		£280,000
Tendering process	Year 2	£10,000	£25,000		£35,000
Works process year 1	Year 3	£10,000	£90,000	£4,100,000	£4,200,000
Works process year 2	Year 4	£10,000	£80,000	£2,100,000	£2,190,000
	Total	£120,000	£745,000	£6,200,000	£7,065,000

Revised Estimate

- 2.21 Taking 13% of £3.7m gives a value for additional items of £484,177 which gives a cost saving of around £380,000 compared with the total of the values given in Columns 3 and 4 of **Table 2.2**.
- 2.22 A summary of the original and revised scheme costs are shown in **Table 2.3**. This shows that the total revised scheme costs equates to £6.26 million in 2007 prices.

Table 2.3 Revised Scheme Costs

Item	Original Scheme Cost	Revised Scheme Cost
Construction Cost	4,196,905	3,697,711
Land Purchase	-	60,500
Contingency	N/A	2,020,000
Optimism Bias @ 44%	1,890,638	N/A
Sub Total	6,187,544	5,778,211
MSBC Submission	50,000	N/A
Additional Costs	815,000	484,177
Total	7,052,544	6,262,388

Outturn Costs

Tender Price Inflation

- 2.23 Driven by a boom in construction in recent years, construction inflation is significantly higher than retail inflation: current forecasts by Cyril Sweett³ range between 4.5% and 6.5% per annum over the period to 2011, with tender price inflation for Yorkshire and Humberside forecast at around 5%, as shown in **Table 2.4**.

Table 2.4 Forecast Increases in Tender Prices

Tender price forecasts	2007	2008	2009	2010	2011
East Anglia	5.5	5.25	5.0	5.0	5.0
East Midlands	4.5	4.5	4.0	4.0	4.0
West Midlands	4.5	4.5	4.0	4.0	4.0
North	5.0	5.0	5.0	4.5	4.5
Yorks & Humber	5.0	5.0	5.0	4.5	4.5
N West	5.0	4.75	4.5	4.25	4.25
N Ireland	5.0	4.0	5.0	5.25	5.5
Scotland	4.5	4.25	4.0	4.0	4.5
Greater London	6.5	6.25	5.75	5.5	5.5
South East (ex London)	5.5	5.25	5.0	5.0	5.0
South West	5.5	5.5	4.5	4.5	4.5
Wales	4.5	4.5	4.0	4.0	4.0
UK Average	5.25	5.0	4.75	4.5	4.5
Republic of Ireland	3.0	-10.0	-2.0	5.0	5.0

Source: *Tender Price Forecast (Q1 2008)*, Cyril Sweett, February 2008

- 2.24 Davis Langdon's assessment⁴ is that over the period 2007-2012, workload within the construction sector associated with the Olympics will add a further 1-2% to current inflation trends, equating to an average inflation rate of 6% per annum from 2008 onwards which is slightly higher than the Cyril Sweett forecast. An inflation rate of 6% per annum has therefore, been used to produce the outturn costs presented in **Table 2.5**.
- 2.25 Savills land value research⁵ showed that average farmland values have increased by 15% in 2006 across Great Britain, recording a total growth of 50% since the beginning of 2004, 37.5% over the last year. However, over the last 10 years agricultural land has gone up by 58%⁶ which equates to 4.7% per annum. Therefore, the high inflation rates seen over recent years is very unlikely to be sustained, therefore an inflationary rate of 10% per annum has been applied to the land costs.

³ Tender Price Forecast (Q1 2008), Cyril Sweett, February 2008

⁴ Market Forecast. Davis Langdon, Building, 2006, Issue 18

⁵ Agricultural Land Market Survey No. 26, Savills, Spring 2007.

⁶ <http://agriculturalland.com/>

Table 2.5 Out-turn Cost

Project Element	Timing	Cost 2007 Prices	Outturn Cost
Land Purchase	2009-10	76,830	92,964
Detail Surveys and Preliminary Design	2009-10	73,954	83,095
Planning Orders and processes	2009-10	159,805	179,557
	2010-11	119,324	142,117
Detail Design	2009-10	188,170	211,427
Tendering process	2009-10	21,964	24,678
Works process (including site supervision)	2010-11	1,100,392	1,310,584
	2011-12	4,521,949	5,708,856
Total		6,262,387	7,753,279

2.26 The Regional Transport Board (RTB) agreed to £7.065million in outturn costs. The outturn costs are within 10% of the sum agreed by the RTB.

Appendix A

Original Scheme Costs

Item	Description	Unit	Quantity	Rate	Total
100: Preliminaries					
1	Erection, servicing and dismantling of stores and messes for the Contractor (including provision of services)	item	-	290,000.00	290,000.00
2	Information board for the works	No.	2	3,500.00	7,000.00
3	Traffic safety and management (including road closure and diversion)	item	-	350,000.00	350,000.00
4	Establishment of haul roads	item	-	85,000.00	85,000.00
5	Provision of temporary access routes	item	-	55,000.00	55,000.00
6	Security fencing	item	-	50,000.00	50,000.00
200: Site Clearance					
7	Take up box section barrier (P3) and remove to tips off site	m	50	10.00	500.00
8	Take up existing kerbing and remove to tips off site	m	50	5.00	250.00
9	Removal of existing fencing	m	200	3.00	600.00
10	Removal of trees and bushes	item	-	1,500.00	1,500.00
10a	general site clearance	ha	40	1,000.00	40,000.00
300: Fencing					
11	Post and rail fencing	m	2540	14.00	35,560.00
12	Timber gates and posts to match post and rail fencing	No.	3	250.00	750.00
400: Road Restraint Systems (Vehicle and Pedestrian)					
13	Untensioned single sided corrugated beam straight or curved exceeding 120m radius	m	360	80.00	28,800.00
14	Short post with standard spacers for setting in concrete for single sided corrugated beam			inc	
15	Standard concrete foundation for post for corrugated beam			inc	
500: Drainage and Service Ducts					
Watercourse					
16	2800mm dia Armco culvert	m	34	1,150.00	39,100.00
17	Concrete headwall to 2800mm dia Armco culvert	No.	2	1,750.00	3,500.00
Stormwater					
18	Concrete weir to balancing pond overflow	No.	1	2,200.00	2,200.00
19	Concrete outfall to 300mm dia pipe	No.	2	750.00	1,500.00
20	Road gully with Class D400 ductile iron grate and frame to BS 497	No.	60	300.00	18,000.00
21	300mm dia pipe for stormwater run-off (carriageway)	m	1500	26.00	39,000.00
22	Oil interceptor	No.	2	6,500.00	13,000.00

23	Manhole	No.	20	750.00	15,000.00
23a	Ditching	m	3000	10.00	30,000.00
600: Earthworks					
Excavation					
24	Excavation of acceptable material	m3	7500	10.00	75,000.00
25	Excavation of hard material	m3	200	40.00	8,000.00
26	Excavation for channels	m3	1500	9.50	14,250.00
27	Excavation for ponds	m3	7600	9.50	72,200.00
28	Excavation (stripping) of topsoil - 200mm thick layer	m3	5000	9.50	47,500.00
Deposition of Fill					
29	Imported acceptable fill	m3	41000	10.00	410,000.00
30	Deposition of stripped topsoil	m3	5000	7.50	37,500.00
31	Deposition of acceptable material	m3	12500	8.50	106,250.00
32	Compaction of fill	m3	12500	3.00	37,500.00
33	Capping	m3	5200	28.00	145,600.00
Disposal					
34	Disposal of hard material	m3	200	10.00	2,000.00
35	Disposal of material	m3	7750	8.00	62,000.00
Geotextile					
36	Geotextile reinforcement to earthworks	m2	100000	2.50	250,000.00
700: Pavements					
Carriageway					
37	30mm thick stone mastic asphalt surface course	m2	10800	8.50	91,800.00
38	70mm thick dense Macadam binder course	m2	10800	12.50	135,000.00
39	3210mm thick dense Macadam base	m2	10800	35.00	378,000.00
40	225mm thick Type 1 unbound sub-base	m3	2915	35.00	102,025.00
Access Roads					
41	100mm thick DBM	m2	365	15.00	5,475.00
42	200mm thick Type 1 unbound sub-base	m3	73	35.00	2,555.00
43	Grasscrete	m2	100	55.00	5,500.00
1100: Kerbs, Footways & Paved areas					
Kerbs					
44	Splay kerbs	m	2750	12.50	34,375.00
1200: Traffic Signs and Road Markings Permanent Traffic Signs					
45	Advance direction signs	No.	12	1,000.00	12,000.00
46	Chevron markers	No.	12	850.00	10,200.00
Road Markings					
47	Continuous line in thermoplastic 150mm wide	m	2500	1.30	3,250.00
48	Intermittent line in thermoplastic 100mm wide with 6000mm line and 3000mm gap	m	1200	0.50	600.00
49	Intermittent line in thermoplastic 220mm wide with	m	55	1.30	71.50

	500mm line and 500mm gap				
50	Intermittent line in thermoplastic 100mm wide with 4000mm line and 2000mm gap	m	85	1.00	85.00
51	Intermittent line in thermoplastic 100mm wide with 2000mm line and 7000mm gap	m	100	1.00	100.00
52	Ancillary line in thermoplastic 100mm wide	m	55	1.00	55.00
53	Ancillary line in thermoplastic 150mm wide	m	3	1.30	3.90
54	Arrow in thermoplastic 6000mm long	No.	4	50.00	200.00
	Road Studs				
55	White road stud with reflector	No.	130	5.00	650.00
	Permanent Bollards				
56	Internally illuminated bollards	No.	8	350.00	2,800.00
	1300: Road Lighting Columns and Brackets				
	Street Lighting				
57	Steel road lighting column of 10m nominal height with flanged base plate and with single bracket arm having a projection of 1.5m with a luminaire unit incorporating a 135w SOX lamp	No.	12	1,100.00	13,200.00
	1400: Electrical Work for Road Lighting and Traffic Signs				
	Cable and Duct				
58	Cable and duct in trench depth not exceeding 1.5m	m	380	35.00	13,300.00
59	Feeder pillar	No.	2	800.00	1,600.00
	3000: Landscape and Ecology				
	Seeding and Turfing				
60	Grass seeding by conventional sowing to all surfaces	m2	20000	0.50	10,000.00
	Additional cost items				
61	Upgrade of level crossing	item	-	1,000,000.00	1,000,000.00
62	Dealing with existing underground services	item	-	-	
63	Protection to Gas Transmission Main	item	-	-	
64	Land Purchase				
	Sub Total				4,196,905.40
	Optimism Bias	%	44		1,846,638.38
	Total				6,043,543.78

Appendix B

Revised Scheme Costs

Item	Description	Unit	Quantity	Rate	Total
100: Preliminaries					
1	Erection, servicing and dismantling of stores and messes for the Contractor (including provision of services)	item	-	290,000.00	290,000.00
2	Information board for the works	No.	2	3,500.00	7,000.00
3	Traffic safety and management (including road closure and diversion)	item	-	350,000.00	350,000.00
4	Establishment of haul roads	item	-	85,000.00	85,000.00
5	Provision of temporary access routes	item	-	55,000.00	55,000.00
6	Security fencing	item	-	50,000.00	50,000.00
200: Site Clearance					
7	Take up box section barrier (P3) and remove to tips off site	m	50	10.00	500.00
8	Take up existing kerbing and remove to tips off site	m	50	5.00	250.00
9	Removal of existing fencing	m	200	3.00	600.00
10	Removal of trees and bushes	item	-	1,500.00	1,500.00
10a	general site clearance	ha	40	1,000.00	40,000.00
300: Fencing					
11	Post and rail fencing	m	2540	14.00	35,560.00
12	Timber gates and posts to match post and rail fencing	No.	3	250.00	750.00
400: Road Restraint Systems (Vehicle and Pedestrian)					
13	Untensioned single sided corrugated beam straight or curved exceeding 120m radius	m	360	80.00	28,800.00
14	Short post with standard spacers for setting in concrete for single sided corrugated beam			inc	
15	Standard concrete foundation for post for corrugated beam			inc	
500: Drainage and Service Ducts					
Watercourse					
16	2800mm dia Armco culvert	m	34	1,150.00	39,100.00
17	Concrete headwall to 2800mm dia Armco culvert	No.	2	1,750.00	3,500.00
Stormwater					
18	Concrete weir to balancing pond overflow	No.	1	2,200.00	2,200.00
19	Concrete outfall to 300mm dia pipe	No.	2	750.00	1,500.00
20	Road gully with Class D400 ductile iron grate and frame to BS 497	No.	60	300.00	18,000.00
21	300mm dia pipe for stormwater run-off (carriageway)	m	1500	26.00	39,000.00
22	Oil interceptor	No.	2	6,500.00	13,000.00
23	Manhole	No.	20	750.00	15,000.00
23a	Ditching	m	1725	10.00	17,250.00

	600: Earthworks				
	Excavation				
24	Excavation of acceptable material	m3	7500	10.00	75,000.00
25	Excavation of hard material	m3	200	40.00	8,000.00
26	Excavation for channels	m3	2590	9.50	24,605.00
27	Excavation for ponds	m3	7600	9.50	72,200.00
28	Excavation (stripping) of topsoil - 200mm thick layer	m3	10000	9.50	95,000.00
	Deposition of Fill				
29	Imported acceptable fill	m3	33500	25.00	837,500.00
30	Deposition of stripped topsoil	m3	10000	2.00	20,000.00
31	Deposition of acceptable material	m3	41000	2.00	82,000.00
32	Compaction of fill	m3	41000	0.79	32,390.00
33	Capping	m3	5200	28.00	145,600.00
	Disposal				
34	Disposal of hard material	m3	200	10.00	2,000.00
35	Disposal of material	m3	7750	8.00	62,000.00
	Geotextile				
36	Geotextile reinforcement to earthworks	m2	100000	2.50	250,000.00
	700: Pavements				
	Carriageway				
37	30mm thick stone mastic asphalt surface course	m2	10800	8.50	91,800.00
38	70mm thick dense Macadam binder course	m2	10800	12.50	135,000.00
39	3210mm thick dense Macadam base	m2	10800	22.92	247,536.00
40	225mm thick Type 1 unbound sub-base	m3	2430	35.00	85,050.00
	Access Roads				
41	100mm thick DBM	m2	365	15.00	5,475.00
42	200mm thick Type 1 unbound sub-base	m3	73	35.00	2,555.00
43	Grasscrete	m2	100	55.00	5,500.00
	1100:Kerbs, Footways & Paved areas				
	Kerbs				
44	Splay kerbs	m	2750	12.50	34,375.00
	1200: Traffic Signs and Road Markings				
	Permanent Traffic Signs				
45	Advance direction signs	No.	12	1,000.00	12,000.00
46	Chevron markers	No.	12	850.00	10,200.00
	Road Markings				
47	Continuous line in thermoplastic 150mm wide	m	2500	1.30	3,250.00
48	Intermittent line in thermoplastic 100mm wide with 6000mm line and 3000mm gap	m	1200	0.50	600.00
49	Intermittent line in thermoplastic 220mm wide with 500mm line and 500mm gap	m	55	1.30	71.50

50	Intermittent line in thermoplastic 100mm wide with 4000mm line and 2000mm gap	m	85	1.00	85.00
51	Intermittent line in thermoplastic 100mm wide with 2000mm line and 7000mm gap	m	100	1.00	100.00
52	Ancillary line in thermoplastic 100mm wide	m	55	1.00	55.00
53	Ancillary line in thermoplastic 150mm wide	m	3	1.30	3.90
54	Arrow in thermoplastic 6000mm long	No.	4	50.00	200.00
	Road Studs				
55	White road stud with reflector	No.	130	5.00	650.00
	Permanent Bollards				
56	Internally illuminated bollards	No.	8	350.00	2,800.00
	1300: Road Lighting Columns and Brackets				
	Street Lighting				
57	Steel road lighting column of 10m nominal height with flanged base plate and with single bracket arm having a projection of 1.5m with a luminaire unit incorporating a 135w SOX lamp	No.	12	1,100.00	13,200.00
	1400: Electrical Work for Road Lighting and Traffic Signs				
	Cable and Duct				
58	Cable and duct in trench depth not exceeding 1.5m	m	380	35.00	13,300.00
59	Feeder pillar	No.	2	800.00	1,600.00
	3000: Landscape and Ecology				
	Seeding and Turfing				
60	Grass seeding by conventional sowing to all surfaces	m2	20000	0.50	10,000.00
	Additional cost items				
61	Upgrade of level crossing	item	-	-	-
62	Dealing with existing underground services	item	-	-	45,000
63	Protection to Gas Transmission Main	item	-	-	-
64	Land Purchase	Ha	6.05	10,000.00	60,500.00
65	Complementary Improvement Works to B1210, A1173 and Pelham Road	item			177,500
	Sub Total				3,758,211.40
	Optimism Bias	%	0		
	Contingency				2,020,000.00
	Total				5,778,211.40