

Studies and Work to Support Crawley Borough Council and Horsham District Council Preferred Option Joint Area Action Plan

Development Costs and Revenues



Prepared for:
Crawley Borough
Council and
Horsham District
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Prepared by:
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**Studies and Work to
Support Crawley Borough
Council and Horsham
District Council Preferred
Option Joint Area Action
Plan**

**Development Costs and
Revenues**

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Client Contact Name: Steve Dennington and Barbara Childs

Client Company Name: Crawley Borough Council and Horsham District Council

Issued By: URS Corporation Ltd.
 St Georges House
 5 St Georges Road
 Wimbledon
 London SW19 4DR
 United Kingdom
 Tel: + 44 (0) 20 8944 3300
 Fax: + 44 (0) 20 8944 3301
 www.urseurope.com

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Issue No:	Name	Signature	Date	Position
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Prepared by	Chris Quigley		06/07/07	Regeneration Consultant
Checked by	Gareth Edgley		06/07/07	Project Manager
Approved by	Rory Brooke		06/06/07	Project Director

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1. INTRODUCTION

This paper has been prepared by URS for Crawley Borough Council and Horsham District Council to support the West & North West Crawley Joint Area Action Plan (JAAP). The paper is the final element of a suite of studies that research the social, economic and environmental context of the Area of Study. This research outlines factors affecting the financial viability of planned development of a Strategic Development Location (SDL) to the West and North West of Crawley and sets out the capital costs that are expected to be required and that will need to be covered by developers and various public sector agencies.

The Development Costs and Revenues report provides estimates of:

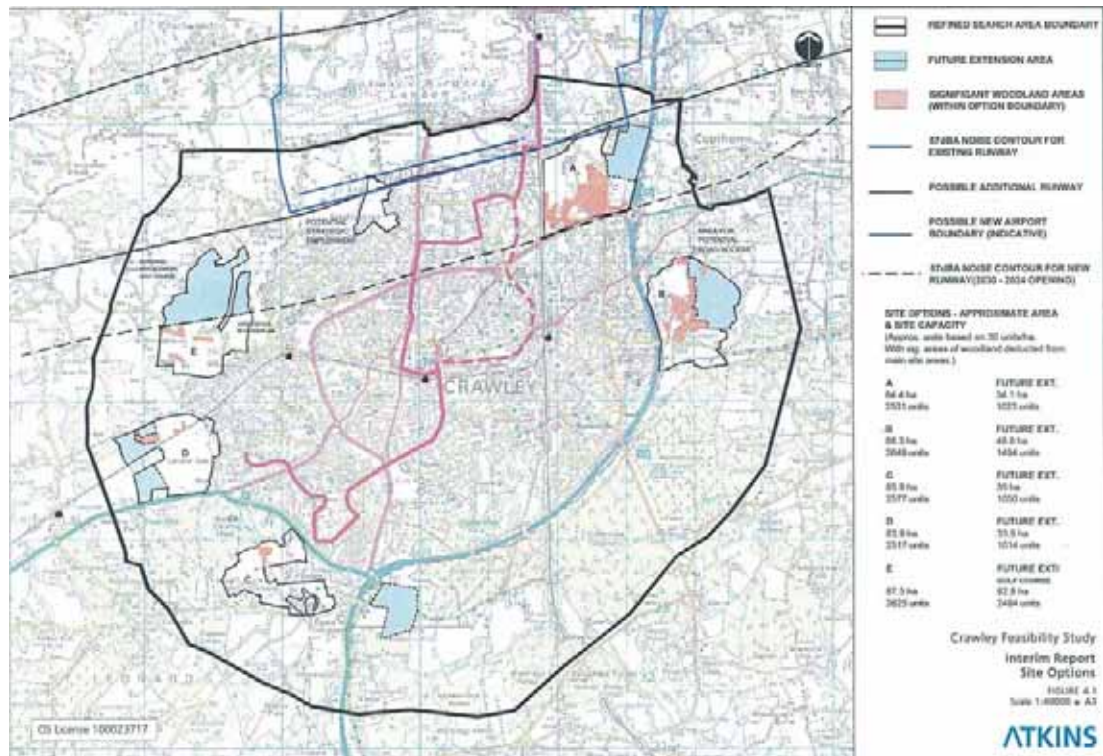
- The total capital costs relating to the development, including the costs of infrastructure and the completed building costs
- The potential contribution to these costs that may be expected from planning obligations, and
- The potential value of the completed development.

This assessment is undertaken at a broad level and draws upon the recommendations developed in the four related URS research papers that cover employment, remediation, transport and social infrastructure. The paper helps develop the building blocks of research that will inform the masterplan process. The aspects of financial viability covered in this paper are estimated in the absence of a decision on the geographical location of development within the Area of Study and this could also affect the costings. This report must therefore be considered on a broad-brush basis.

At this stage the exact size of the new neighbourhood is not known. Therefore calculations have been run for three scenarios - for 2,000 dwellings, 2,500 dwellings and for 3,000 dwellings. These three scenarios provide a level of flexibility for costing the future development.

This paper considers two sites as potential locations for the new neighbourhood. These sites are referred to as Site D and Site E in the *Feasibility Study for Development Options at Crawley* produced by Atkins in 2005 and are shown in Figure 1-1.

Figure 1-1 Potential Development Locations



Source: Feasibility Study for Development Options at Crawley (Atkins, 2005)

In this report Site D is referred to as the Bewbush site and Site E as the Ifield site, named after their adjoining neighbourhoods. Social infrastructure and utilities¹ are costed the same for both sites but the costs of land remediation and transport infrastructure are different due to the Bewbush site containing an inert landfill and their differing distances from the strategic road network.

¹ The costings for utilities will vary between the two sites but detailed information is not currently available from service providers on how this will differ. Therefore a flat rate has been taken for both sites.

2. THE DEVELOPMENT COSTS AND REVENUES FRAMEWORK

This research will help inform development viability assessments, or development appraisals, which are common tools in the property and development sector. The report breaks down the costing process of a development and ultimately informs whether, from a financial point of view, the development is viable. The variables in a development viability assessment are outlined below.

Completed Development Value *(the cost for the sale of the scheme and the receipt from a RSL for completed affordable housing units)*

Profit *(the return on investment the developer is seeking to secure)*

Construction Cost of Development *(building costs)*

Infrastructure Costs *(principal infrastructure)*

The variables described above can be used to calculate the residual land value. This is a commonly used variable in determining whether a development is viable or not. It is calculated from the value of the completed development less the profit, the construction costs of the development, the infrastructure costs and the cost of capital.

Residual Land Value = Completed Development Value less (Profit + Construction Costs of the Development + Infrastructure Costs + Cost of Capital)

The cost of capital relates to the cost of borrowing to cover the period between the expenditure of construction and the revenue from the sale of the properties. This aspect is not covered here.

If the residual land value is sufficiently positive and above the existing land value there would be a financial incentive for the landowner or developer to proceed with development. However, the return for the landowner and/or return for the developer may not be enough if the residual land value is not sufficiently above the existing land value. In this situation public sector agencies could step in to bridge this gap (between existing and residual). For example, if the development was vital for meeting local housing targets the local authority may reduce the level of developer contributions or reduce the share of affordable housing in order to help make the development more viable. This is termed

'gap-funding' and is outlined in Planning Circular C5/2005² which states in Paragraph B10 that:

'In some instances, perhaps arising from different regional or site-specific circumstances, it may not be feasible for the proposed development to meet all the requirements set out in local, regional and national planning policies and still be economically viable. In such cases, and where the development is needed to meet the aims of the development plan, it is for the local authority and other public sector agencies to decide what is to be the balance of contributions made by developers and by the public sector infrastructure providers in its area supported, for example, by local or central taxation. If, for example, a local authority wishes to enable development to be acceptable in planning terms and therefore proceed, thereby contributing to the sustainability of the local area. In such cases, decisions on the level of contribution should be based on negotiation with developers over the level of contribution that can be demonstrated as reasonable to be made whilst still allowing development to take place.'

These circumstances are also recognised in Horsham District Council's *Planning Obligations Supplementary Planning Document*. Chapter 3 Paragraph 3.3 states that:

'It is acknowledged, however, that, in some instances, it may not be feasible for the proposed development to meet all the requirements set out in local, regional and national policies and still be economically viable. Notwithstanding this, it may still be in the local interest to bring the development forward, for example to meet an identified need or the objectives of the spatial strategy. In such instances, it may be necessary for additional infrastructure to be provided to serve the development in order to make it acceptable in planning terms and the local authority may wish to provide this infrastructure itself.'

Ultimately the developer will aim to maximise profitability by minimising the construction and infrastructure costs of the development.

The residual land value and thus the viability of the development is strongly influenced by the phasing of the development and the consequent cash flow. For example, the scheme may not be able to sustain large costs incurred early in the development even if in the long run it makes a profit. This report does not cover a detailed cash flow model but instead presents the relevant costs and revenues related to the SDL. These are the key building blocks that feed into a development viability assessment and present an initial guide as to the potential finances of the development.

² Office of Deputy Prime Minister (2005) Planning Circular C5/2005

2.1. Principles and Limitations of the Development Costs and Revenues

For the purposes of this report the following assumptions and principles are used and are described in more detail in the relevant chapters:

- Affordable housing provision is taken at 40% of the total units in the development (see Section 4).
- An approximate split of tenure is taken from discussions with Crawley Borough Council and Horsham District Council (see Section 4).
- Raw build costs are an average of £1,100 per sq.m per unit, as set out in the Horsham District Council *Planning Obligations Supplementary Planning Document* (see Section 5).
- Professional fees, insurance, contingency and related costs are taken to be 12% of the build costs (see Section 5)³.
- House prices are taken from *Crawley Borough Affordable Housing Viability Study* and adjusted to reflect recent trends (see Section 6).
- The amount received by the developer from the RSL for affordable housing units is equivalent to the average build costs (see Section 6)
- Developer (gross) profit is fixed at 15% of value (see Section 6).

Whilst this report makes use of the most recent costings available, there are some limitations within the development revenues and costs. These are:

- The costs of remediation are difficult to accurately estimate.
- Construction costs and the final development value will be strongly dependent on the mix of units; the design merits; adopted level from the Code for Sustainable Homes, etc.
- The level of profit usually varies with the degree of risk but no account has been taken of this at this stage.

³ URS has taken this from the *Crawley Borough Affordable Housing Viability Study* but notes that the level of 12% may be too low.

3. POLICY CONTEXT

A key element when considering the development costs and revenues is the level of monies sought through the planning gain system. Section 106 (S106) contributions determine how the developer will mitigate the impact of the development and pay for services and facilities for the new residential population. In the context of the SDL for the West & North West of Crawley the developer is anticipated to be liable for funding planning obligations for infrastructure. This section outlines the principle behind planning obligations and why they are only relevant to the site in question.

3.1. Planning Obligations

An updated planning circular was published in July 2005 by the Office of the Deputy Prime Minister (now DCLG⁴) to clarify the basis on which planning obligations should be assessed. Circular C5/2005 replaced the Department of the Environment Circular 1/97 and sets out certain reforms to the planning obligation system. A key point to be drawn from C5/2005 is that planning obligations must be solely related to the proposed development and not act as a vehicle for filling existing infrastructure or funding shortfalls. Paragraph B5 states that:

'The Secretary of State's policy requires, amongst other factors, that planning obligations are only sought where they meet all of the following tests.

A planning obligation must be:

(i) relevant to planning;

(ii) necessary to make the proposed development acceptable in planning terms;

(iii) directly related to the proposed development;

(iv) fairly and reasonably related in scale and kind to the proposed development; and

(v) reasonable in all other respects.'

Paragraph B7 of C5/2005 also states that:

'Similarly, planning obligations should never be used purely as a means of securing for the local community a share in the profits of development, i.e. as a means of securing a "betterment levy".'

⁴ Department for Communities and Local Government

This is reiterated through Paragraph B35 which states that:

'Standard charges and formulae applied to each development should reflect the actual impacts of the development... Their main purpose is to give greater certainty to developers and increase the speed of negotiations. Standard charges and formulae should not be applied in blanket form regardless of actual impacts, but there needs to be a consistent approach to their application. Whether local authorities seek a standard charge will depend upon the nature of the proposed development.'

The obligation has to be directly and exclusively related to the development and cannot be used to pay for existing infrastructure shortfalls.

3.2. Developer Contributions for the Strategic Development Location

The planning obligations relevant to the SDL in the West & North West of Crawley are outlined in the Horsham District Council *Planning Obligations Supplementary Planning Document* (SPD). The SPD outlines the requirements for planning obligations as set out in the adopted Horsham District *Core Strategy (2007)*. These planning obligations must be seen as a guide because as described in Section 2, there is a certain level of flexibility over the discussions between the Council and the developer relating to the level of commitments required. On this last point the SPD states in Chapter 5 Paragraph 5.4 that:

'It is therefore important to retain a level of flexibility in negotiations regarding the contribution as it is not always possible to identify the specific services for which the land or finance may need to be secured by way of developer contributions when land is allocated in a development plan document.'

The developer contributions applicable to the SDL are outlined in full in Section 5.1.5.

4. CHARACTERISTICS OF THE RESIDENTIAL DEVELOPMENT

This section outlines the assumptions used for calculating the costs and revenues associated with the SDL. This includes the level of affordable housing, the dwelling types and the relevant sizes of each dwelling type. This is necessary for accurately calculating the build costs and the completed development value.

4.1.1. Affordable Housing

The split of affordable housing is taken to be 40% of the total units of the development. This is consistent with the *Crawley Local Development Framework Submission Core Strategy* Policy H5 and the *Horsham District Council Local Development Framework Core Strategy (2007)* Policy CP12. The 40% provision has also been judged to be viable by the *Crawley Borough Affordable Housing Viability Study* prepared in February 2006 by Adams Integra⁵. This study supported the policy proposal to increase affordable housing provision to a target of 40%.

Table 4-1 calculates the number of open market dwellings and the number of affordable housing units for each of the development scenarios.

Table 4-1 Applying the Affordable Housing Split of 40%

	<i>Scenario 1 of 2,000 dwellings</i>	<i>Scenario 2 of 2,500 dwellings</i>	<i>Scenario 3 of 3,000 dwellings</i>
Open market	1,200	1,500	1,800
Affordable housing	800	1,000	1,200

Source: URS calculations

4.1.2. Tenure Split and Dwelling Size

At this early stage of planning the exact split of dwelling types is unknown. However, discussions with both Crawley Borough Council and Horsham District Council have allowed us to formulate an approximate guide as to the types and sizes of houses/flats they will be seeking for affordable housing. It is therefore assumed that this split is also applicable to the open market dwellings.

Table 4-2 outlines the percentages and numbers sought of each dwelling type and the approximate size of the dwelling.

⁵ Crawley Borough Council (2006) *Crawley Borough Affordable Housing Viability Study*

Table 4-2 Estimated Type Split and Dwelling Sizes

	<i>Estimated Housing Mix</i>	<i>Number of dwellings in Scenario 1</i>	<i>Number of dwellings in Scenario 2</i>	<i>Number of dwellings in Scenario 3</i>	<i>Dwelling size⁶</i>
1 bed flat	25%	500	625	750	51 sq.m
2 bed flat	20%	400	500	600	61 sq.m
2 bed house	25%	500	625	750	76 sq.m
3 bed house	25%	500	625	750	86 sq.m
4+ bed house	5%	100	125	150	101 sq.m
TOTAL	100%	2,000	2,500	3,000	-

Source: Horsham District Council and Crawley Borough Council Housing Position Statement, May 2007 and Crawley Borough Affordable Housing Viability Study, 2006

⁶ The sizes for the dwellings are taken from the *Crawley Borough Affordable Housing Viability Study* (2005) and are based on research in the Crawley area. In practice these sizes may vary in relationship to the split of tenure and the spatial distribution.

5. COSTS

5.1. Infrastructure

This section builds upon the conclusions of the four reports produced by URS for the SDL in the West & North West of Crawley covering employment, social infrastructure, land remediation and transport. It also takes account of information provided by the councils and previous work by Atkins. Ancillary infrastructures, such as street furniture and car parking, are not costed in this assessment. This is primarily because the development is still at the early stages of planning and no detailed spatial plans are available for how the SDL will take geographical shape. Therefore the assessment is made up of costings for:

- Strategic infrastructure (transport),
- Local infrastructure required to support individual developments (social infrastructure and utilities), and
- Exceptional costs (land remediation).

The assumptions behind the infrastructure costings are provided in detail in Appendix A.

5.1.1. Infrastructure – Social Infrastructure and Utilities

Table 5-1, Table 5-2 and Table 5-3 draw on the social infrastructure requirements as set out in the *Neighbourhood Assessment* (URS, 2007) and discussions with utilities service providers.

Table 5-1 Infrastructure Costs for Social Infrastructure and Utilities in a SDL of 2,000 Dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£13.50	£13.50
	Health	£5.08	£5.08
	Playing Pitches	£0.07	£0.07
	Open Space	£0.35	£0.35
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc

Source: URS calculations, see Appendix A

Table 5-2 Infrastructure Costs for Social Infrastructure and Utilities in a SDL of 2,500 Dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£16.89	£16.89
	Health	£5.78	£5.78
	Playing Pitches	£0.07	£0.07
	Open Space	£0.44	£0.44
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc

Source: URS calculations, see Appendix A

Table 5-3 Infrastructure Costs for Social Infrastructure and Utilities in a SDL of 3,000 Dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£20.30	£20.30
	Health	£6.50	£6.50
	Playing Pitches	£0.09	£0.09
	Open Space	£0.52	£0.52
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc

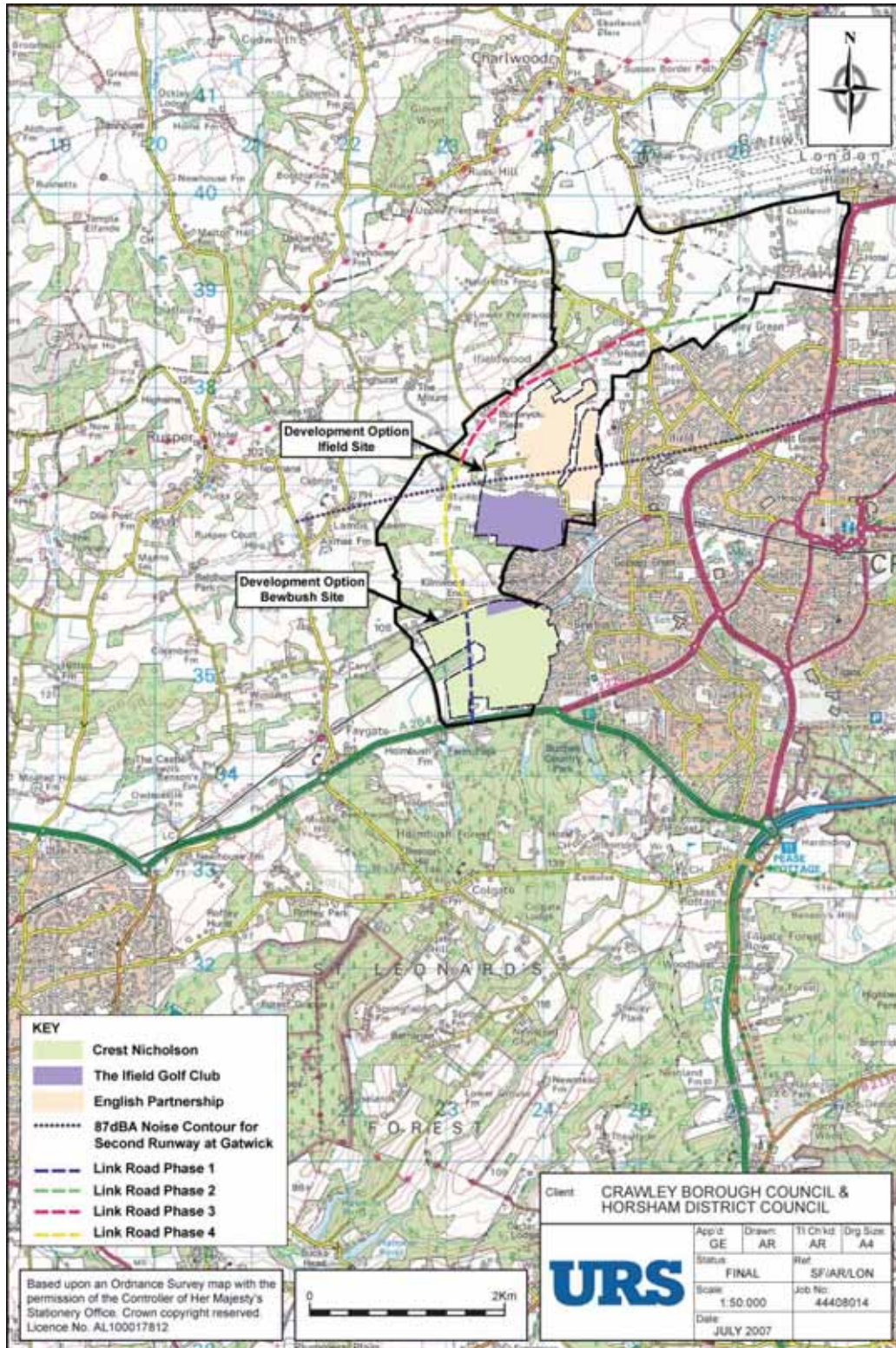
Source: URS calculations, see Appendix A

5.1.2. Infrastructure – Transport

The assumptions for transport infrastructure costs are drawn from the *Transport Position Statement* (URS, 2007) and are displayed in Figure 5-1. The Bewbush site is considered stand-alone and has a maximum cost of between £5 and £7 million for a spur road⁷. The Ifield site is more complicated and involves multiple landowners and thus may be developed in stages, therefore having a knock-on effect on connecting transport roads. For the purposes of this calculation the site is assumed to be one development in isolation of the Bewbush site thereby assuming the entire cost of the link roads at between £21.0 and £27.0 million.

⁷ These transport costs take improved public transport and walking/cycling provision to each site, traffic calming on local roads, junction improvements on the A23-A2220-A264 corridor and improvements at M23 J11 as a given.

Figure 5-1 Suggested Phasing of Link Roads in the West and North West of Crawley



5.1.3. Infrastructure – Remediation

Detailed assumptions on land remediation are presented in Appendix C and Appendix D. The maximum cost for Option 1 is taken as £9.25 million and Option 2 is costed at £3 million.

5.1.4. Total Infrastructure Costs

The total infrastructure costs are presented in Table 5-4, Table 5-5 and Table 5-6.

Table 5-4 Estimates of Infrastructure Costs for a SDL of 2,000 dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£13.50	£13.50
	Health	£5.08	£5.08
	Playing Pitches	£0.07	£0.07
	Open Space	£0.35	£0.35
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc
Transport		£5.00 to 7.00	£21.00 to £27.00
TOTAL		£39.91 to £41.91	£55.91 to £61.91
Remediation Option 1		£9.25	-
TOTAL		£49.16 to £51.16	-
Remediation Option 2		£3.00	-
TOTAL		£42.91 to £44.91	-

Source: URS calculations, see Appendix A

Table 5-5 Estimates of Infrastructure Costs for a SDL of 2,500 dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£16.89	£16.89
	Health	£5.78	£5.78
	Playing Pitches	£0.07	£0.07
	Open Space	£0.44	£0.44
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc
Transport		£5.00 to £7.00	£21.00 to £27.00
TOTAL		£44.07 to £46.07	£60.07 to £66.07
Remediation Option 1		£9.25	-
TOTAL		£53.32 to £55.32	-
Remediation Option 2		£3.00	-
TOTAL)		£47.07 to £49.07	-

Source: URS calculations, see Appendix A

Table 5-6 Estimates of Infrastructure Costs for a SDL of 3,000 dwellings

<i>Infrastructure/facility</i>		<i>Bewbush site (cost £m)</i>	<i>Ifield site (£m)</i>
Social Infrastructure	Education	£20.30	£20.30
	Health	£6.50	£6.50
	Playing Pitches	£0.09	£0.09
	Open Space	£0.52	£0.52
	Mixed-use Community Centre	£1.91	£1.91
Utilities	Water	£4.00	£4.00
	Sewerage	£4.50	£4.50
	Electricity	£5.50	£5.50
	Gas	tbc	tbc
Transport		£5.00 to £7.00	£21.00 to £27.00
TOTAL		£48.29 to 50.29	£64.29 to £70.29
Remediation Option 1		£9.25	-
TOTAL		£57.54 to £59.54	-
Remediation Option 2		£3.00	-
TOTAL)		£51.29 to 53.29	-

Source: URS calculations, see Appendix A

On land identified in the *Feasibility Study for Development Options at Crawley* (Atkins, 2005) as Site D (the Bewbush site) a development of 2,000 dwellings would entail costs of at least £42 to £51 million, depending on the costs of transport infrastructure and land remediation. On the same site a development of 2,500 dwelling would have infrastructure costs of between £47 and £55 million and a 3,000 dwelling development would have costs of at between £51 to £60 million.

On the Ifield site a development of 2,000 dwellings would entail infrastructure costs of either at least £56 million or £62 million dependent on the scale of land remediation required. The 2,500 dwelling development on the same site would have infrastructure costs of between £60 and £66 million and the development of 3,000 dwellings would have infrastructure costs of at least approximately £64 million or £70 million.

5.1.5. Developer Contributions

Table 5-7 presents some indicative costs for developer contributions towards the SDL. The SPD requirements are general and will alter depending on the nature of the scheme, e.g. type of tenure (and thus occupancy rate) and current need⁸.

⁸ In addition the SPD does not provide guideline costs for health provision because this will be dependent on consultations between the Council and the local PCT.

Table 5-7 Social Infrastructure Developer Contributions for the SDL in the West & North West of Crawley JAAP

<i>Infrastructure category</i>	<i>Horsham SPD requirement</i>	<i>Scenario 1 of 2,000 dwellings (£m)</i>	<i>Scenario 2 of 2,500 dwellings (£m)</i>	<i>Scenario 3 of 3,000 dwellings (£m)</i>
Education	£6,753 per dwelling	£13.5	£16.9	£20.3
Open space, sport and recreation	Between £1,240 and £2,285 per dwelling	£2.5 to £4.6	£3.1 – £5.7	£3.7 to £6.9
Community facilities	Between £280 and £560 per dwelling	£0.6 to £1.1	£0.7 – £1.4	£0.8 to £1.7
Libraries	£286 per dwelling	£0.6	£0.7	£0.9
Fire/Rescue ⁹	£105 per dwelling	£0.2	£0.3	£0.3
Public Art	Between £200 and £300 per dwelling	£0.4 to £0.6	£0.5 – £0.8	£0.6 to £0.9
Recycling Services	£100 per dwelling	£0.2	0.3	£0.3
TOTAL	-	£17.9 to £20.8	£22.4 – £26.0	£26.9 to £31.2

Source: Horsham District Council Planning Obligations Supplementary Planning Document (Annually Reviewed Annexes 2007-08)

The above calculations show that the social infrastructure developer contributions would be between approximately £17.9 million and £20.8 million for an SDL of 2,000 dwellings, between approximately £22.4 million and £26.0 million for an SDL of 2,500 dwellings and between approximately £26.9 million and £31.2 million for 3,000 dwellings. These figures do not cover other potential S106 contributions such as affordable housing and transport infrastructure.

5.2. Construction Cost of Development

5.2.1. Build Cost

Building costs are dependent on a number of factors, including quality of design, the strength of the labour market and the phasing of the development. This chapter takes building costs estimates from the Horsham District Council *Planning Obligations Supplementary Planning Document (2007)*. These build costs are used by Horsham Council to calculate the relevant payments by a Registered Social Landlord (RSL) for completed affordable units. It would be expected that build costs would vary depending on the unit type and standard, however an average of £1,100 per sq.m has been taken for all units. It is possible that market housing would be built to a higher standard and build costs would reflect this. However, for the purposes of this report build costs are taken to be the same for both affordable and market units. These build costs are also

⁹ In addition the provision of fire hydrants will be required. The Horsham Planning Obligations SPD prices them at between £500 and £750 each. These are not included in the costings table because the exact number required is unknown.

taken to represent current prices. It is recognised that labour costs could have potentially increased by the time the development is started, however for the purposes of this exercise current prices are used.

Table 5-8, Table 5-9 and Table 5-10 calculate the total build costs for an SDL of 2,000, 2,500 and 3,000 dwellings respectively.

Table 5-8 Raw Build Costs for an SDL of 2,000 dwellings

<i>Dwelling Type</i>	<i>Dwelling Size</i>	<i>Build Cost per sq.m</i>	<i>Number of dwellings in the development</i>	<i>Raw Build Cost</i>
1 bed flat	51 sq.m	£1,100	500	£28,050,000
2 bed flat	61 sq.m	£1,100	400	£26,840,000
2 bed house	76 sq.m	£1,100	500	£41,800,000
3 bed house	86 sq.m	£1,100	500	£47,300,000
4+ bed house	101 sq.m	£1,100	100	£11,110,000
TOTAL	-	-	2,000	£155,100,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

Table 5-9 Raw Build Costs for an SDL of 2,500 dwellings

<i>Dwelling Type</i>	<i>Dwelling Size</i>	<i>Build Cost per sq.m</i>	<i>Number of dwellings in the development</i>	<i>Raw Build Cost</i>
1 bed flat	51 sq.m	£1,100	625	£35,062,500
2 bed flat	61 sq.m	£1,100	500	£33,550,000
2 bed house	76 sq.m	£1,100	625	£52,250,000
3 bed house	86 sq.m	£1,100	625	£59,125,000
4+ bed house	101 sq.m	£1,100	125	£13,887,500
TOTAL	-	-	2,500	£193,875,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

Table 5-10 Raw Build Costs for an SDL of 3,000 dwellings

<i>Dwelling Type</i>	<i>Dwelling Size</i>	<i>Build Cost per sq.m</i>	<i>Number of dwellings in the development</i>	<i>Raw Build Cost</i>
1 bed flat	51 sq.m	£1,100	750	£42,075,000
2 bed flat	61 sq.m	£1,100	600	£40,260,000
2 bed house	76 sq.m	£1,100	750	£62,700,000
3 bed house	86 sq.m	£1,100	750	£70,950,000
4+ bed house	101 sq.m	£1,100	150	£16,665,000
TOTAL	-	-	3,000	£232,650,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

It is our understanding that the SDL will aim to comply with sustainable building standards. Therefore it is necessary to adjust the raw build cost to take account of this. Discussions with Crawley Borough Council and Horsham District Council have allowed us to formulate a guide as to the minimum level of code required in each phase of the development in line with the Code for Sustainable Homes¹⁰. The impacts of the development phasing on build costs are shown in Table 5-11.

Table 5-11 Increases in Build Costs Due To Sustainability Measures

<i>Phase of development</i>	<i>% of overall development</i>	<i>Minimum Code Level Requirement</i>	<i>The Increase in Build Cost for flats</i>	<i>The Increase in Build Costs for houses</i>
1 (2010 – 2013)	24%	Level 3	2.9%	3.7%
2 (2013 – 2016)	48%	Level 4	6.6%	6.7%
3 (2016 – 2018)	28%	Level 6	32.7%	22.7%

Source: A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (Cyril Sweett, 2007).

The revised build costs are presented in Table 5-12, Table 5-13 and Table 5-14.

¹⁰ For a detailed breakdown on the assumptions behind the sustainability calculations see Appendix B.

Table 5-12 Raw Build Costs with Sustainable Building Code Level 3 for an SDL of 2,000 Dwellings

Dwelling Type	<i>Raw Build Cost</i>	<i>Build Cost with Sustainability factored in</i>
1 bed flat	£28,050,000	£31,702,110
2 bed flat	£26,840,000	£30,334,568
2 bed house	£41,800,000	£46,172,280
3 bed house	£47,300,000	£52,247,580
4+ bed house	£11,110,000	£12,272,106
TOTAL	£155,100,000	£172,728,644

Source: A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (Cyril Sweett, 2007).

Table 5-13 Raw Build Costs with Sustainable Building Code Level 3 for an SDL of for 2,500 Dwellings

Dwelling Type	<i>Raw Build Cost</i>	<i>Build Cost with Sustainability factored in</i>
1 bed flat	£35,062,500	£39,627,638
2 bed flat	£33,550,000	£37,918,210
2 bed house	£52,250,000	£57,715,350
3 bed house	£59,125,000	£65,309,475
4+ bed house	£13,887,500	£15,340,133
TOTAL	£193,875,000	£215,910,805

Source: A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (Cyril Sweett, 2007).

Table 5-14 Raw Build Costs with Sustainable Building Code Level 3 for an SDL of for 3,000 Dwellings

Dwelling Type	<i>Raw Build Cost</i>	<i>Build Cost with Sustainability factored in</i>
1 bed flat	£42,075,000	£47,553,156
2 bed flat	£40,260,000	£45,501,852
2 bed house	£62,700,000	£69,258,420
3 bed house	£70,950,000	£78,371,370
4+ bed house	£16,665,000	£18,408,159
TOTAL	£232,650,000	£259,092,966

Source: A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (Cyril Sweett, 2007).

The above calculations show that the raw construction cost of the development would be approximately £173 million for 2,000 dwellings, £216 million for 2,500 dwellings and £260 million for 3,000 dwellings.

5.2.2. Additional Construction Costs

In addition to the raw build costs there are a number of additional construction costs involved with building residential dwellings. These costs are taken from the *Crawley Borough Affordable Housing Viability Study (2006)* and are made up of the following:

- Architect fees – 3.5% of build costs
- Consultant fees (e.g. engineer, planning supervisor, project manager) – 3% of build costs
- Contingencies – 3% of build costs¹¹
- Insurances – 2.5% of build costs

In total these represent 12% of the raw build costs. Table 5-15 calculates the effect of the additional construction costs on the raw build costs.

Table 5-15 Total Construction Costs

	<i>Build Cost with Sustainability factored in</i>	<i>Additional Construction Costs</i>	<i>Total Construction Cost</i>
2,000 dwellings	£172,728,644	12%	£193,456,081
2,500 dwellings	£215,910,805	12%	£241,820,102
3,000 dwellings	£259,092,966	12%	£290,184,122

Source: URS calculations

The above calculations show that the total construction cost of the housing would be approximately £194 million for 2,000 dwellings, £242 million for 2,500 dwellings and £291 million for 3,000 dwellings. These costs though do not include costs such as local roads and landscaping.

¹¹ In URS' experience, 3% is a low level of contingency funds.

6. REVENUE

6.1. Completed Development Value

The completed development value is the amount that the developer will receive on completion or sale of the scheme, through a combination of sale on the open market and income from RSLs for the affordable housing units. A number of variables go into calculating the completed development value and this chapter outlines the main assumptions used.

6.1.1. House Prices

Open Market

The costings for house prices are taken originally from the *Crawley Borough Affordable Housing Viability Study* (2006). Adams Integra derived these prices from research on the contract sale prices of all available new build properties across the Crawley Borough. However, this data is from late 2005 and it is necessary to adjust the prices to reflect recent trends.

In the period between the last quarter of 2005 and the first quarter of 2007 the price of the average semi-detached house in Crawley increased from £201,162 to £222,728 which represents an increase of 10.7%¹². Similarly, the price of an average flat in Crawley increased from £139,780 to £149,959 which represents an increase of 7.3%¹³. The prices for all tenure have therefore been increased to reflect current prices. Table 6-1 outlines the average house prices for the different dwelling types.

¹² <http://www.upmystreet.com/property/prices/trends/semi-detached//crawley-4593.html>

¹³ <http://www.upmystreet.com/property/prices/trends/flats//crawley-4593.html>

Table 6-1 Assessed House Prices in Crawley Borough by Tenure

	<i>House price in the last quarter of 2005</i>	<i>House price in the first quarter of 2007</i>
1 bed flat	£150,000	£160,923
2 bed flat	£195,000	£209,200
2 bed house	£225,000	£249,120
3 bed house	£280,000	£310,016
4+ bed house	£340,000	£376,448

Source: Crawley Borough Affordable Housing Viability Study (2006) and adjustments to reflect recent trends.

As noted earlier, a SDL West & North West Crawley is unlikely to be on the open market until 2010/11 and housing prices are likely to have changed by then. However for the purposes of this exercise we take all costs and revenues at 2007 prices.

Affordable Housing

We assume that the developer will receive monies equivalent to the build costs for all completed affordable units and will provide the relevant land for free. Horsham District Council, the *Planning Obligations Supplementary Planning Document*, has set out the price to be paid by an RSL for affordable units and these are outlined in Table 6-2. This is assumed to be £1,100 per sqm for both flats and houses.

Table 6-2 Building Costs for Affordable Housing

	<i>Build cost per sq.m</i>	<i>Dwelling size</i>	<i>Revenue per dwelling</i>
1 bed flat	£1,100	51 sq.m	£56,100
2 bed flat	£1,100	61 sq.m	£67,100
2 bed house	£1,100	76 sq.m	£83,600
3 bed house	£1,100	86 sq.m	£94,600
4+ bed house	£1,100	101 sq.m	£111,100

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

6.1.2. Calculating the Completed Development Value

Taking into account the assumptions outlined above, Table 6-3, Table 6-4 and Table 6-5 calculate the total completed development value for scenarios of 2,000 dwellings, 2,500 dwellings and 3,000 dwellings.

Table 6-3 Completed Development Value for an SDL of 2,000 Dwellings

	Open Market			Affordable		
	Revenue per dwelling	Number of dwellings	Total	Revenue per dwelling	Number of dwellings	Total
1 bed flat	£160,923	300	£48,276,900	£56,100	200	£11,220,000
2 bed flat	£209,200	240	£50,207,976	£67,100	160	£10,736,000
2 bed house	£249,120	300	£74,736,000	£83,600	200	£16,720,000
3 bed house	£310,016	300	£93,004,800	£94,600	200	£18,920,000
4+ bed house	£376,448	60	£22,586,880	£111,100	40	£4,444,000
TOTAL	-	1,200	£288,812,556	-	800	£62,040,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

Table 6-4 Completed Development Value for an SDL of 2,500 Dwellings

	Open Market			Affordable		
	Revenue per dwelling	Number of dwellings	Total	Revenue per dwelling	Number of dwellings	Total
1 bed flat	£160,923	375	£60,346,125	£56,100	250	£14,025,000
2 bed flat	£209,200	300	£62,759,970	£67,100	200	£13,420,000
2 bed house	£249,120	375	£93,420,000	£83,600	250	£20,900,000
3 bed house	£310,016	375	£116,256,000	£94,600	250	£23,650,000
4+ bed house	£376,448	75	£28,233,600	£111,100	50	£5,555,000
TOTAL	-	1,500	£361,015,695	-	1,000	£77,550,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

Table 6-5 Completed Development Value for an SDL of 3,000 Dwellings

	Open Market			Affordable		
	Revenue per dwelling	Number of dwellings	Total	Revenue per dwelling	Number of dwellings	Total
1 bed flat	£160,923	450	£72,415,350	£56,100	300	£16,830,000
2 bed flat	£209,200	360	£75,311,964	£67,100	240	£16,104,000
2 bed house	£249,120	450	£112,101,000	£83,600	300	£25,080,000
3 bed house	£310,016	450	£139,507,200	£94,600	300	£28,380,000
4+ bed house	£376,448	90	£33,880,320	£111,100	60	£6,666,000
TOTAL	-	1,800	£433,218,834	-	1,200	£93,060,000

Source: Crawley Borough Affordable Housing Viability Study, 2006 and Horsham District Council Planning Obligations Supplementary Planning Document, 2007.

The total development values, combining both open market and affordable housing, are shown below in Table 6-6.

Table 6-6 The Completed Development Value

	<i>Open market</i>	<i>Affordable</i>	Total
Scenario 1 (2,000 dwellings)	£288,812,556	£62,040,000	£350,852,556
Scenario 2 (2,500 dwellings)	£361,015,695	£77,550,000	£438,565,695
Scenario 3 (3,000 dwellings)	£433,218,834	£93,060,000	£526,278,834

Source: URS calculations

The above calculations show that the completed development value would be approximately £351 million for 2,000 dwellings, £439 million for 2,500 dwellings and £526 million for 3,000 dwellings.

6.2. Profit

The assessment assumes a developer's profit of 15% of the completed development value. This level is taken from the *Crawley Borough Affordable Housing Viability Study* (2006) which is based on working experience from Adams Integra. The study states that:

'[The model] uses a developer's profit (gross) fixed at 15% of gross development value, which is at the lower end of the acceptable profit range in normal circumstances. Some developers will look at alternative profit criteria, for example a higher percentage (perhaps up to 30%).'

Table 6-7 calculates the level of profit accrued by the developer when a minimum standard of 15% is applied to the completed development value.

Table 6-7 Developer Profit Levels from the Completed Development

	<i>Completed Development Value</i>	<i>Profit level</i>	<i>Profit</i>
Scenario 1 (2,000 dwellings)	£350,852,556	15%	£52,627,883
Scenario 2 (2,500 dwellings)	£438,565,695	15%	£65,784,854
Scenario 3 (3,000 dwellings)	£526,278,834	15%	£78,941,825

Source: URS calculations

The above calculations show that if the developer seeks a 15% profit the profit level would be approximately £53 million for 2,000 dwellings, approximately £66 million for 2,500 dwellings and £79 million for 3,000 dwellings. This assumes the

developer takes a profit on the construction costs of the RSL properties as well as the value of the open market housing. The figures do not include return on other land uses but given the expected land use mix these are anticipated to be modest or non-existent compared to the return on the residential elements of development.

7. CONCLUSION

The preceding chapters have outlined the financial costs associated with an SDL to the West & North West of Crawley. These variables can be seen as building blocks to help inform the more detailed masterplan process. The aim of this section is to provide an initial steer on the development viability of the SDL. To fully judge the viability of the development at either site these variables need to be set in a temporal framework where financial flows are modelled over time. This will help determine the cost of the capital needed to fund the development.

Table 7-1, Table 7-2 and Table 7-3 outline the costs and revenues for both sites and for both scenarios of neighbourhood size. Note some elements of costs, such as local roads and landscaping, are not included and so the data does not give a full picture.

Table 7-1 A Summary of the Costs and Revenues Associated with an SDL of 2,000 Dwellings

		<i>Bewbush Site (£m)</i>	<i>Ifield Site (£m)</i>
Costs	Infrastructure	£44.9 or £55.2	£61.9
	Construction cost of development	£193.5	£193.5
Revenues	Completed development value	£350.9	£350.9
	Profit at 15%	£52.7	£52.7

Source: URS calculations

Table 7-2 A Summary of the Costs and Revenues Associated with an SDL of 2,500 Dwellings

		<i>Bewbush Site (£m)</i>	<i>Ifield Site (£m)</i>
Costs	Infrastructure	£49.1 or £55.3	£66.1
	Construction cost of development	£241.8	£241.8
Revenues	Completed development value	£438.6	£438.6
	Profit at 15%	£65.8	£65.8

Source: URS calculations

Table 7-3 A Summary of the Costs and Revenues Associated with an SDL of 3,000 Dwellings

		<i>Bewbush Site (£m)</i>	<i>Ifield Site (£m)</i>
Costs	Infrastructure	£53.3 or £59.5	£70.3
	Construction Cost of Development	£290.1	£290.1
Revenues	Completed Development Value	£526.3	£526.3
	Profit at 15%	£78.9	£78.9

Source: URS calculations

The difference between the two sites lies in the infrastructure costs but is not great in the context of the overall estimated development value, which has a maximum value of approximately £521 million (for the 3,000 dwelling development). However, each site has different risks attached to it. Where the Bewbush site has higher costs related to the risks of land remediation, the Ifield site has higher costs related to transport infrastructure. In terms of development financing, the Ifield site also presents a greater level of expenditure at the early part of construction, if the transport infrastructure is a pre-requisite to development.

The costs in Table 7-1, Table 7-2 and Table 7-3 make the assumption that each site could come forwards for development independently of the other. However, Section 5.1.2 showed that, from a transport infrastructure perspective, the Bewbush site is the preferred option as first site that is developed, given the immediate potential to improve public transport and the ability to provide a self-contained link road from the A264. This would also make the Ifield site more viable, as the series of link roads can extend upon the access road of the Bewbush site, rather than the developer having to bear the entire cost of the link roads.

Whilst this report presents much of the core information on the financial costs and revenues associated with the development of an SDL in the West & North West of Crawley further research is needed to model the development over time to estimate the cost of borrowing. Once established, the viability of development and scope to cover infrastructure costs through S106 commitments can be assessed.

APPENDIX A – INFRASTRUCTURE ASSUMPTIONS

Infrastructure Category	Assumption
<i>Education</i>	<p>Data is taken from the Department of Education and Skills Education Projects Cost and Performance Data for 2007-08. It would be possible to calculate splits (and thus costs) of pupils that go to new schools and those that attend existing ones. However this would be dependent on a number of unknowns, such as geographical locations, which schools would take on surplus, the character of new schools, and developer's willingness to release land. Therefore Cost Multipliers are used which are averages of construction costs for new schools and extensions to existing schools. The Cost Multipliers are derived from BB98 (Briefing Guide for Secondary School Projects) and BB99 (Briefing Guide for Secondary School Projects) area standards.</p> <p>The Cost Multipliers for 2007-08 in West Sussex are:</p> <ul style="list-style-type: none"> - Primary School £11,434 per pupil - Secondary School £17,471 per pupil - Post 16 £18,755 per pupil <p>This represents a total of approximately £13.5 million for 2,000 dwellings, £16.9 million for 2,500 dwellings and approximately £20.3 million for 3,000 dwellings.</p>
<i>Health</i>	<p>Primary – The cost of £2.18 million is taken from the <i>Milton Keynes Supplementary Planning Document on Social Infrastructure</i> (2005). Appendix 10 on the 'Projected Cost of Health Care Provision for Milton Keynes to 2016' states that a 4 GP surgeries costs £2.18 million. The SDL is predicted to require between three and five GP's and it is therefore felt that this figure for 4 GP's is suitable for both scenarios.</p> <p>Secondary – The Department of Health Hospital Activity Statistics state that in the South East there are 2.8 acute beds per 1,000 people. This therefore relates to 14 extra beds in the 2,000 dwelling development, 18 beds in the 2,500 dwelling development and 22 beds for the 3,000 dwelling development. Cost per bed can vary greatly depending on the hospital in question. <i>The Cost and Funding of Growth in South East England</i> (RTP, 2005) states that £200,000 per bed is an appropriate average for smaller hospitals, such as Crawley. This equates to £2.9</p>

	<p>million for the 2,000 dwelling development, £3.6 million for the 2,500 dwelling development and £4.3 million for the 3,000 dwelling development.</p>
<i>Playing Pitches</i>	<p>An element of playing pitches could be provided by the local school (commonly in the form of a Multi-Use Games Area), as is the case with Oriel High in Maidenbower and Ifield Community College. Therefore the costings are for less than the stated requirement of between 6.2 and 9.3 hectares of active open space.</p> <p>In the developments of 2,000 dwellings and 2,500 dwellings the costings are for two football pitches (1.6ha) and four tennis courts (2.8ha). This totals £66,700. For the development of 3,000 dwellings the costings are for three football pitches (2.4 ha) and four tennis courts (2.8ha). This totals £84,900.</p> <p>The build costs are taken from the SPON's Architects and Builders Price Book 2007.</p>
<i>Open Space</i>	<p>The requirement for passive open space (6.2 ha to 9.3 ha) could be met through landscaped areas within the neighbourhood or from the fact that both potential sites border on to areas of countryside.</p> <p>SPON's Architects and Builders Price Book 2007 provides a costing for soft landscaping which is £5.65 per sq.m. This therefore equates to £350,000 for the 2,000 dwelling development, £435,050 for the 2,500 dwelling development and £525,400 for the 3,000 dwelling development.</p>
<i>Mixed-use Community Centre</i>	<p>The Neighbourhood Assessment paper suggested the introduction of a flexible community centre that can accommodate a mix of uses. Therefore for costings purposes the community centre and library have been grouped together into one 1,000 sq.m centre, with 300 sq.m of library and 700 sq.m of general use.</p> <p>The Horsham District Council <i>Planning Obligations Draft Supplementary Planning Document</i> states that the build cost for providing a new library is £2,400 per sq.m. This equates to £720,000. A build cost for general community space is assumed to be £1,700 per sq.m (<i>Milton Keynes Supplementary Planning Document on Social Infrastructure, 2005</i>) and this equates to £1.19 million.</p> <p>The total cost for the mixed-use community centre is £1.91 million.</p>
<i>Water</i>	<p>Discussions with Chris Kneale at Southern Water highlight</p>

	that they have no reason to doubt the accuracy of the figures provided in the Atkins <i>Feasibility Study for Development Options</i> . Greater accuracy and clarity could be provided once a masterplan is completed and specific local circumstances are known. In addition to the £4 million is the cost for pipelines. This cost is highly dependent on location.
<i>Electricity</i>	Discussions with John Park at EDF Energy revealed approximate costs for infrastructure. Of the £5.5 million total, £4.5 million would cover reinforcements to the load off the Southgate station and £1 million would go towards new infrastructure (cables, smaller sub-station) on the development site. EDF, in line with the regulator, would seek developer contributions towards part of this cost.
<i>Sewerage</i>	Discussions with Oliver Harrison of Thames Water have revealed the complexities in putting approximate costs on new infrastructure. Infrastructure will need to be upgraded at the Crawley Sewerage Treatment Works and then a new network for the development will need to be connected into this. Thames Water are currently preparing their submission to the Ofwat 5 yearly Asset Management Plan and until this is clarified it is 'near impossible' for them to put a cost to the required infrastructure. Therefore the costings are taken from the Atkins <i>Feasibility Study for Development Options</i> which are approximately £4.5 million.
<i>Gas</i>	Drafting note: awaiting further information from client.
<i>Transport</i>	<p>The Bewbush site is considered stand-alone and has a maximum cost of between £5 and £7 million for a spur road. The Ifield site is more complicated and involves multiple landowners and thus may be developed in stages, therefore having a knock-on effect on connecting transport roads. For the purposes of this calculation the site is assumed to be one development in isolation of the Bewbush site thereby assuming the entire cost of the link roads at between £21.0 and £27.0 million.</p> <p>The link roads do not account for the entirety of transport infrastructure improvements required. Further research is needed to quantify the improvements necessary to public transport and walking/cycling provision to each site, traffic calming on local roads, junction improvements on the A23-A2220-A264 corridor and improvements at M23 J11.</p>
<i>Land Remediation</i>	See detailed comments on the assumptions made in Appendix C and Appendix D. For Option 1 the maximum

	cost estimate of £9.25 million is taken. Option 2 is £3 million.
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APPENDIX B – SUSTAINABILITY BUILD COSTS

There are different ways of achieving the relevant code levels in the Code for Sustainable Homes. For example the following four scenarios are recognised for reaching the required energy levels:

- Scenario 1 Initial energy efficiency measures followed by use of solar thermal technology and then photovoltaics and biomass systems.
- Scenario 2 Initial energy efficiency measures initially followed by use of small scale wind turbines and then biomass systems.
- Scenario 3 Development with shared energy services, such as combined heat and power (CHP).
- Scenario 4 Achievement of Code level 3 without recourse to renewable energies through the use of a whole house mechanical ventilation system with heat recovery and by assuming the use of proprietary construction details.

The percentage increase in build costs will differ between the four scenarios due to the varying technologies used. For the purposes of this calculation Scenario 2 is taken to provide an average cost for achieving the code levels. The report entitled *A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (2007)* provides the following capital increases when achieving the relevant code level.

Table B-1 Increases in Build Costs in Scenario 2

	<i>To achieve Level 3</i>	<i>To achieve Level 4</i>	<i>To achieve Level 6</i>
Low-rise apartments ¹⁴	2.9%	6.6%	32.7%
Traditional detached house ¹⁵	3.7%	6.7%	22.7%

Source: A cost review of the Code for sustainable homes: Report for English Partnerships and the Housing Corporation (Cyril Sweett, 2007).

¹⁴ Taken to be the flats in the SDL

¹⁵ Taken to be the houses in the SDL

APPENDIX C - REMEDIAL COST ESTIMATION

At this stage in the assessment of the site (not yet fully characterised in terms of a Phase II assessment) it is difficult to recommend costs associated with remediation, as indicated in URS's 'Realising your Development' (see Appendix C). However, given the information provided and based on a number of assumptions, a rough estimation is provided below.

To date, SLR has not developed a detailed remediation strategy for the site as confirmation of the final development footprint, layout and landform is required. Furthermore in order to confirm the scope of remedial works, SLR agree that further investigation of the site is required.

In terms of remediation SLR is considering two potential remedial options - source removal and elimination of the potential contaminant pathway. The remedial option will depend upon whether or not the final site landform and development requires removal of soil materials to facilitate development. If significant site remodelling and earth moving is required then the removal of some or all of the source contamination may be the most appropriate option. However, if it is determined that ground levels will not be reduced then they will consider the most appropriate option is to eliminate the potential pathways by which contamination could migrate to sensitive receptors.

Remedial Option 1 - Source Removal

SLR reported that the ground profile may be affected by the need to minimise energy requirements at the site and to limit the visual impact of the development, therefore it is unlikely that the current site profile will be that of the development. If significant site remodelling is required, then remedial works will follow a source removal strategy and focus on:

- Excavation of fill from the areas of the site that contain wood, timber and Alluvium greater than 5%;
 - The installation, as a precautionary measure, of a gas protection membranes in order to mitigate against any residual gas risks (only at properties constructed on the areas that have been subject to landfilling);
 - Placement of suitable subsoil and 'clean' topsoils in garden areas; and
 - The installation of a drainage system to capture and treat leachate, for the duration of the development works that could potentially be encountered during soil movements in order to protect water quality in Bewbush.
-

Remedial Option 2 - Eliminating Contaminant Pathways

SLR reported that if the final landform does not necessitate significant remodeling, then remedial works to eliminate the pathways between potentially contaminated soils and gases, and identified receptors, may be the most appropriate remediation strategy. At this stage it is described in outline only, but it would focus on:

- Installation of suitably engineered gas impermeable membranes and passive venting systems across parts of the site that would be used for built development (i.e. excluding areas of open space). The membrane would be placed at least 1m below ground level and locally deeper for service trenches. Passive venting systems would include sub-floor vents and a network of gas collection pipework connected to above ground passive vent systems designed to visually integrate with streetworks infrastructure;
- Placement of suitable subsoil and 'clean' topsoils in garden areas; and
- Diversion of Bewbush Brook into a purpose built clay-lined channel with appropriate landscaping and ecological restoration.

COST ESTIMATE

Remedial Option 1 - Source Area Removal

Proposed Strategy	Cost
Excavation, removal and disposal of Fill	£7,500,000
Installation of gas protection membrane	£500,000
1 m of top soil in gardens (assumed this is addressed as part fill removal)	£0
Leachate treatment system	£250,000 per year (£500,000 - £1,250,000) ¹⁶
Total (Option 1)	£8,500,000 - £9,250,000

Remedial Option 2 - Pathway Elimination

Proposed Strategy	Cost
Installation of gas protection membrane	£500,000

¹⁶ SLR has indicated that remediation of the site is expected to take up to two years. However, they anticipate that it could be completed over a phased programme, therefore, the treatment system may be required from 2 to 5 years.

1 m of top soil in gardens	£2,000,000
Diversion of brook to clay lined channel	£100,000
Removal of hotspots if required (as may not be addressed through pathway elimination)	£400,000
Total (Option 2)	£3,000,000

The costs estimations above are based on several assumptions including:

- This cost estimation is only associated with the area infilled under the Waste Management Licence (36 hectares);
 - Depth of fill is assumed to be 5.4 m below ground level (the average thickness of inert waste at the site, based on SLR borehole and trial pit logs);
 - It has been assumed that 15% of the site is deemed high risk (may contain hazardous soils), 60% medium risk (non-hazardous soil or methane producing soils) and 25% low risk (inert material);
 - Costs for 'excavation of fill' are based on the assumption that 10% of each hectare of high and medium risk areas requires removal, as it is assumed that screening of soils will take place at the site (costs of screening plant and support are not included);
 - Cost for low risk area are not included as it is based on the assumption that a subsequent investigation and risk assessment is sufficient to satisfy the appropriate regulators;
 - Gas protection membrane will be required on 70% of the site area (assumes that membranes will not be required in gardens and open areas);
 - Based on the level of contamination currently identified at the site, it is assumed that 25% of the site would require 1 m of top soil in gardens, however, this may change based on further investigation completed at the site; and
 - Landscaping and ecological restoration costs for the Bewbush brook are not included.
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APPENDIX D

