

VALUE ENGINEERING CASE STUDIES

We aim to provide our Clients with a seamless service delivery from all aspects of ground engineering through to building substructure and superstructure works. This is achieved through a truly co-ordinated engineering approach with all facets of our business working in close collaboration. Our approach to these different disciplines working together from the same office ensures a unified and integrated approach to engineering problems resulting in a complete solution that takes account of all relevant engineering design parameters.

There are numerous examples of projects where we have provided our Clients with value engineered solutions resulting in significant capital cost savings including the following:

1. Cheadle Royal for Muse Developments
2. Broughton Moor for Persimmon Homes
3. City Quay, Liverpool for David McLean Homes
4. Sawmill Lane, Brampton for Persimmon Homes
5. Mellor Street Rochdale for Henry Boot Developments
6. Marsh Farm, Cleveleys, for Persimmon Homes
7. Meir Park, Stoke for Henry Boot Developments
8. Magellan Park, Whitehaven for Story Homes
9. Shotley Bridge, County Durham for Story Homes
10. Browside Road, Dearham for Story Homes



1. Office Developments, Cheadle Royal for Muse Developments

Project cost: £5 million per office park plot

Engineering savings: £150,000

Integra have acted as civil and structural engineers on numerous discrete office park plot developments within Cheadle Royal Business Park. A number of these developments were undertaken close to a stream corridor that extends through the Business Park and substantial savings were achieved through the substitution of retaining walls proposed on the original architectural master plan with reinforced earth slopes formed in lime modified soils. This proposal which has now been constructed provided a saving of around £150,000 on each development plot in relation to the original master plan arrangement.



2. Residential Development, Broughton Moor for Persimmon Homes

Project cost: £1 million

Engineering savings: £225,000

Integra undertook additional geo-environmental intrusive investigation at the site following an original ground investigation undertaken by a third party engineer. The original ground investigation advised that the entire site envelope required drilling and grouting due to the presence of worked coal seams beneath the site. There was also a geological fault that ran across the site from east to west. Furthermore, the original ground investigation advised that the elevated subterranean gas readings associated with the mined seams would lead to a requirement for significant gas protection measures at the site.

Integra undertook further detailed geological desk study work involving detailed inspection of the Coal Authority abandonment plans and large scale geological maps of the area. On this basis, we confirmed that the original scope of ground engineering works could potentially be significantly reduced. Further intrusive works undertaken by Integra in the form of core recovery holes confirmed a high degree of competency in the solid (rock) deposits directly above the worked coal seams and consequently the extent of drilling and grouting works at the site was limited to one side of the fault only, reducing the extent of grouting to 30% of the site area and resulting in a saving of approximately £175,000.

The additional intrusive investigation works undertaken also confirmed that a potential mineshaft identified in the original investigation was merely a localised ground depression.

Negotiations were successfully undertaken with both the Local Authority Environment Health Officer and the NHBC to confirm that no gas precautions were required at the development site on the basis that the clay drift deposits over the mined seams provided an impermeable barrier to potential subterranean gases. This led to a further saving of £50,000 relative to the recommendations of the original ground investigation report.



3. Residential Development, City Quay, Liverpool for David McLean Homes

Project cost: £6 million
Engineering savings: £350,000

This apartment block was constructed at Liverpool Docklands on the site of an infilled dock basin. The original ground investigation report produced by a third party engineer was undertaken shortly after infilling works were completed and indicated significant levels of subterranean gases requiring an expensive active gas protection system including alarms and the use of active venting systems involving the use of suspended floor systems as part of the proposed residential development.

In view of the further time elapsed since infilling works had been completed, Integra proposed and subsequently constructed further gas monitoring boreholes to prove that the gas levels and flow rates had reduced significantly since the time of the original investigation. This allowed a simple passive gas protection system for the proposed residential units to be successfully negotiated with the Local Authority Environmental Health Officer.



4. Residential Development, Sawmill Lane, Brampton for Persimmon Homes

Project cost: £1 million

Engineering savings: £200,000

The geo-environmental ground investigation undertaken by Integra demonstrated that the site was heavily contaminated as a result of its previous site uses that included a sawmill with associated underground diesel storage tanks. We proposed an innovative and cost effective environmental remedial solution for the development site with the contaminated soils being excavated and subsequently engineered beneath the envelope of the site access road.

This sustainable remedial solution was agreed with both the Environment Agency and the Local Authority Environmental Health Officer on the basis that the contaminated material was protected from rainfall infiltration due to the impermeable nature of the road surface therefore providing a significant saving in relation to the cost of removal of the impacted material to landfill.



5. Commercial / Retail Development, Mellor Street, Rochdale for Henry Boot Developments

Project cost: £3.5 million

Engineering savings: £650,000

The original architectural master plan for the project identified a retaining wall to the edge of the adjacent River Spodden allowing site levels to be built up to form a site estate road. Integra considered a series of value engineering options to avoid the use of a sheet piled retaining wall on the basis that the wall cost was estimated to be in excess of £300,000 and its construction would have led to significant temporary works to mitigate pollution of the watercourse during construction.

A detailed study of the site plan together with a marginal translation in the line of the estate road led to our solution totally avoiding the use of retaining walls through the provision of reinforced earth slopes formed with site won material at a 1 in 1 gradient extending down to the river footpath with the new estate road formed at the head of the slope.

The ground investigation report, undertaken by a third party engineer, indicated a requirement to undertake a drilling and grouting contract due to the presence of apparently worked coal seams beneath the site. Integra undertook further desk study work involving the detailed inspection of Coal Authority abandonment plans, Local Archive records and large scale geological maps of the area. Intrusive geotechnical investigation undertaken by Integra in the form of core recovery holes subsequently confirmed the competency of the solid (rock) deposits and proved that the underlying coal seams had not actually been worked. Consequently, no drilling and grouting contract was deemed necessary with an associated contract saving of approximately £350,000.



6. Residential Development, Marsh Farm, Cleveleys, for Persimmon Homes

Project cost: £2 million

Engineering savings: in excess of £1 million

This site had previously been deemed commercially 'undevelopable' on the basis of 1 in 100 year flood levels in relation to existing site elevation together with the poor underlying ground conditions. Our civil engineering design involved the mitigation of flood risk by the importation of lightweight materials to raise site levels and the incorporation of a series of attenuation ponds and infiltration ditches to suit the post development surface water drainage design.

The ground remediation design included the importation of pulverized fuel ash fill and the adoption of specialist ground improvement techniques to improve the strength and uniformity of the existing weak / peaty soils. These proposals were agreed with and approved by the Local Authority, Environment Agency and United Utilities resulting in an acceptable and commercially viable adopted road and sewer design to service the new housing estate.



7. Industrial Development, Meir Park, Stoke for Henry Boot Developments

Project cost: £11 million

Engineering savings: £250,000

This 7 hectare site lies in Environment Agency (EA) Source Protection Zone 1 adjacent to a groundwater abstraction point and hence the EA adopted a highly risk averse stance in relation to the potential risk of site soil / water contamination finding a pathway into the underlying sandstone aquifer / abstracted water.

On this basis, Integra undertook a series of sophisticated and detailed environmental numerical risk analyses with key parameters within the analyses either proven by laboratory chemical testing of soil / water samples or alternatively negotiated through with the Environment Agency. As a result, insitu treatment of the site groundwater was totally avoided and remediation was limited to the removal of approximately 500m³ of heavily impacted hydrocarbon contaminated soils associated with leakage from a previous underground diesel storage tank.



8. Magellan Park, Whitehaven for Story Homes

Project cost: £8 million
Engineering savings: £500,000 (est.)

Re-development of a part brownfield site extending over a 30 hectare site area. The brownfield site extent included deposits of significant anhydrite / blastfurnace slag made ground deposits with potential for future expansion on contact with water. Following detailed environmental risk assessment works and subsequent negotiation with the Environment Agency, a sustainable solution was utilised involving the excavation and controlled deposition of these materials in areas of future Public Open Space.

Deep mining history at the site dated back to the 17th century and consequently Integra undertook detailed mining desk study work involving the inspection of Coal Authority abandonment plans, Local Archive records and large scale geological maps of the area. Ultimately, intrusive geotechnical investigation undertaken by Integra in the form of core recovery holes confirmed that there was sufficient competent rock cover over previously worked seams in order that no remediation of mine workings was necessary prior to low rise residential development of the site.



9. Shotley Bridge, County Durham for Story Homes

Project cost: £4 million

Engineering savings: £ 1 million (est.)

Re-development of 12 hectare former hospital site to form a low rise residential housing estate. Significant cut / fill earthworks were undertaken at this sloping site in order to achieve an engineering balance and negate any requirement for retaining walls. Economical surface water drainage design required extensive negotiation with the Environment Agency and submission of a Flood Risk Assessment including detailed flood modelling.

The original ground investigation report, undertaken by a third party engineer, indicated a potential requirement to undertake a drilling and grouting contract due to the presence of worked coal seams beneath the site. Integra undertook further detailed desk study work involving the inspection of Coal Authority abandonment plans, Local Archive records and large scale geological maps of the area. Intrusive geotechnical investigation undertaken by Integra in the form of core recovery holes confirmed that there was sufficient competent rock cover over previously worked seams in order that no remediation of mine workings was deemed necessary with an associated contract saving of approximately £150,000.



10. **Browside Road, Dearham for Story Homes**

Project cost: £3.6 million

Engineering savings: Engineering solution unlocked project

This development site had initially been refused planning permission based on environmental issues associated with an existing colliery spoil heap and drainage capacity related issues.

A review of the existing third party ground investigation report was undertaken leading to further intrusive environmental works and associated detailed liaison with the Environment Agency and the Local Authority Environmental Health Officer.

Through this process, Integra proved the chemical suitability of the colliery spoil material to be distributed over the site without undue risk to controlled waters and, subject to the use of a cover system in gardens / Public Open Space areas, without undue risk to human health.

Post development surface water and foul water drainage connections to watercourse and existing adopted sewer respectively were successfully agreed with the Environment Agency / United Utilities following detailed negotiations.

