Able Humber Ports Ltd

Rosper Road Loop

Feasibility Study

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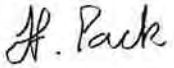
Signature:	
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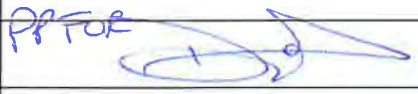
Signature:	
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P03	14/10/2013	Report name amended, vertical profile, costs and comparison added.	VR	HP	JB

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Appendices:

Executive Summary

Able Humber Ports Ltd (AHPL) wish to develop land in North Killingholme for Able Marine Energy Park (AMEP) and Able Logistics Park (ALP). The land is traversed by the existing Killingholme Branch Railway. As part of the development AHPL wish to have unimpeded access across the railway line for wind turbine assembly.

Network Rail has advised AHPL that it wishes to create a circular through route from the Ulceby to Barton line onto the Killingholme line and re-instate the disused part of the Killingholme Branch near Goxhill. This would result in an intensification of train services through the Marine Energy Park. The driver for these extra services is the Aire Valley Power Stations changing over to biomass consumption from coal to meet environmental requirements. Due to the reduced density of wood compared to coal, nearly twice as many trains are required to deliver the same calorific output.

AHPL wish to offer an alternative solution to Network Rail whereby a new shorter and cheaper Rosper Road Loop is constructed between new junctions at South Killingholme on the Immingham to Ulceby line (BRI2) and the Barton and Immingham Light Railway (KIL2). The new chord would form a triangular junction onto the Barton and Immingham Light Railway with one fork facing North towards the Able Marine Energy Park site and one fork facing South towards the Humber International Terminal (for coal and biomass) and Immingham Bulk Terminal (for coal and iron ore).

The operating and business logic is to provide a balloon shaped railway infrastructure for coal and biomass trains. Empty trains would use the new chord line and load at Humber International Terminal and Immingham Bulk Terminal and depart loaded via the existing railway.

This study is an early feasibility study into the constraints and options.

Of the options considered, only Option 1, the most Southerly option was considered viable by both client team and the study. This option has to interface with the existing Highways Authority scheme for an improvement of the A160's T-junction with Rosper Road. This presents issues over how the railway should cross Rosper Road. The conclusion of the study is that it should be by the railway crossing over the road, subject to a satisfactory gradient being achieved on the railway.

Two sub-options have been developed: -

- Option 1a has a shorter bridge over Rosper Road, but sharper curvature and it traverses poorer ground requiring more extensive engineered embankments;
- Option 1b has a longer viaduct over Rosper Road, but better curvature and it traverses better ground West of Rosper Road allowing normal embankments to be constructed there.

On initial costing Option 1b is the preferred option, but this will need to be confirmed by ground investigations and local survey. The length of the chord line is 1625 metres in the feasibility railway design. The costs of the new chord are preliminarily estimated at £38 million including contingency.

A comparison should be made with the original 2008 proposal to reinstate the closed KIL3 section of the Barton and Immingham Light Railway with a chord line at Goxhill, but without any upgrade to the section to Thornton Abbey of the Ulceby to Barton Line. The estimated costs, for the preferred Option C adjusted for inflation to Q4 2012 are £41m. It was considered at the time that any upgrade to the Ulceby to Thornton Abbey section could cost a further £15m, though no detailed work was undertaken on that.

The new shorter Rosper Road Loop will require the current Development Consent Order for the Able Marine Energy Park to be amended or a fresh Transport and Works Act Order under the 2013 regulations for railway works under 2 miles length to be procured.

The conclusion of the study is a new chord line is technically feasible, more readily constructible alternative to the Goxhill scheme and less controversial for the public.

It is a viable alternative to the previous proposal to provide a link to Immingham by re-instating the closed KIL3 section of the Barton and Immingham Light Railway with a chord line at Goxhill.

1.0 Scope of Works

The objective is to produce a feasibility study with budget costs, for a new railway linking the existing Killingholme Branch Line directly with the Immingham to Brocklesby Line to the South of the proposed Able Marine Energy Park.

Able Humber Ports Ltd.'s preferred route is Option 1 as shown on attached plan – AME – 06103A.

The study should indicate whether the railway should be carried by a bridge over Rosper Road, or whether Rosper Road should be lifted on a bridge over the new railway.

The study will ignore issues regarding land ownership and any costs associated therein.

Plan 1 – Extract from Drawing AME – 06103A

2.0 Design Brief

2.1 Data Requirements

Able Humber Ports Ltd is progressing a Development Consent Order Application for the Able Marine Energy Park and has supplied Tata Steel Projects with the available data from this project.

Tata Steel Projects has supplemented this information with available GIS data, additional LIDAR data and previous survey data.

2.2 Methodology

2.2.1 Constraint Mapping

Tata Steel Projects has built a GIS based constraints map of the proposed route. This includes all known environmental features, land use and geological information. This has been supplemented by a site walk through by our engineering team. A preliminary alignment was then produced.

2.2.2 Site visit and workshop

A site visit was undertaken to verify the constraints map and examine the suitability of the preliminary alignment. Then feasible alignments were drawn up. An interdisciplinary workshop was then held to define the environmental and engineering issues and risks.

3.0 Description of Route

The route commences with a junction off the existing Humber Commercial Railway from Brocklesby to Immingham (Engineer's Line Reference BRI2) at approximately 103¾ miles at South Killingholme. It curves in an Easterly direction towards Rosper Road over derelict land, crosses Rosper Road and traverses grazing land attached to Hazel Deane Farm, running parallel to a North Lincolnshire Council Site of Importance to Nature Conservation. It then forks in a northerly direction to join the Barton and Immingham Light Railway (Engineer's Line Reference KIL2). A southern fork is also possible forming a triangle towards the Barton and Immingham Light Railway (Engineer's Line Reference KIL2) and ABP's Humber International Terminal.

The route crosses a buried gas pipeline near its commencement point, an elevated disused gas pipeline near Rosper Road, a buried gas pipeline adjacent to Rosper Road and an elevated gas pipeline near the junction with the Killingholme Branch.

Between the Humber Commercial Railway and Rosper Road the route crosses land susceptible to surface water flooding with little apparent land drainage. Between Rosper Road and the Killingholme Branch there are land drains and the ground is less susceptible to surface water flooding. The nearest habitation is Hazel Deane Farm. The route will reduce the farm's available grazing land.

3.1 Interfaces with other projects

The route will need to interface with the existing Network Rail and Associated British Ports (ABP) project to provide additional capacity at Humber International Terminal for imported coal and biomass traffic.

The Highways Agency are currently developing a scheme for the A160 Humber Road and Rosper Road Junction. This may be completed before the construction of the new railway.

Network Rail are also undertaking a signalling re-control project on the Immingham to Brocklesbury line. The interface with this project and the timescales will need to be understood.

It will also need to interface with AHPL's projects at AMEP and ALG and the C.Ro and C.Gen projects.

3.2 Operating Assumptions

For the purposes of this study we have assumed that the new railway will be a single bi-directional track able to hold a 775m long train clear of the Immingham to Brocklesbury line and the Killingholme Branch. The line-speed is assumed to be 30 mph; this could be increased to 40mph, except that the speed on the Humber Commercial Railway is limited to 30mph at this point.

The curve and junction onto the Killingholme Branch (KIL2) is limited to 25 mph.

The gradients on the new line need to be adequate for the normal operation of 2,500 tonne trains hauled by a Class 66 locomotive.

A 30/40 mph trailing crossover may need to be provided on the Immingham to Brocklesbury line adjacent to the new connection. This should replace the existing 10mph trailing crossover.

The Northern facing fork onto the Killingholme Branch needs to access the existing Killingholme Branch.

The Southern facing fork needs to access the Humber International Terminal and possibly any re-positioned facility at Immingham Bulk Terminal.

The new railway, for the purposes of this study is assumed to be operated as part of the national network, controlled by Network Rail, though it could be operated by another company regulated or exempted by the ORR.

4.0 Findings

Options 2 and 3 have been discarded at an early stage due to the impracticality of making a junction with the existing Humber Commercial Railway. At the proposed junction point there is an extensive network of gas pipelines for the Conoco Oil Refinery and an existing junction for the Total UK refinery.

Option 1 allowed the junction to be placed immediately East of the pipelines at the Conoco Oil Refinery and the existing junctions. However Option 1 will cross the proposed A160 Humber Road and Rosper Road new traffic gyratory junction. The initial optioneering thus is concentrated on the practicality of crossing Rosper Road at this location. Two possibilities are considered: Rosper Road remaining at ground level and Rosper Road lifted over a Railway at or near to ground level.

As the project developed the difficulty of lifting Rosper Road over the new Railway became apparent and the Option 1 progressed with the Railway on a bridge over Rosper Road instead. Two sub-options for the railway route were developed in response to geo-technical issues. These two sub-options were costed and this favoured Option 1b where the railway kept to the better ground.

4.1 Rosper Road at Ground Level

The rail over-bridge would need to be made wider than the current highway width to allow any future dualling of Rosper Road and also for the Highways Agency's scheme for a gyratory link road at the A160 Humber Road and Rosper Road Junction.

The proposed bridge would also have to be made wider on the west side to accommodate the visibility splay of the new gyratory link road and the safety fencing protecting the structure.

The carriageway cannot be lowered due to the heavy congestion of services beneath the carriageway and adjacent verges, including a high pressure gas main.

The proposed large embankment adjacent to the wetlands area may push up levels within the wetland and thus dry out the area. The embankment may also prevent the existing horizontal water egress, possibly requiring several culverts beneath it. These significant issues will need to be consulted on with the Environment Agency and the Internal Drainage Board.

4.2 Rosper Road Lifted

Rosper Road can be lifted above the proposed railway assuming the following: -

- The rail level at the existing road is 4.0m AOD maximum: -
- The length available to lift the road is 240m;
- The required headroom is 5.45m;
- The depth from the road centreline to bridge soffit is 1.5m maximum.

To achieve this the geometry will need to be as follows: -

- South of the bridge the road will start to rise from it's existing level on a 2000m radius 'absolute minimum' sag curve;
- The sag will be followed by a 4.5% gradient;
- Between the gradient and the bridge will be a 1700m radius '1 step relaxation' crest curve;
- The crest curve will result in a '1 step relaxation' in stopping sight distance of 90m, the combination of that and the crest curve resulting in a 'departure from standard' (the departure is to avoid excessive land take, but a full standard curve could be used if needed);

- The alignment will have to come off-line to avoid effecting the existing wetlands and associated ditch, although this will make traffic phasing easier;
- The proposed new link and abnormal load route would become unviable due to height differences, meaning that the existing Humber Road railway bridge would have to be widened to accommodate a dual carriageway, including the changing the Rosper Road/Humber Road junction;
- The abnormal load route may be disrupted;
- The fire station entrance would have to be modified.
- The embankment may prevent the existing horizontal water egress, possibly requiring many culverts beneath it. This option will also require a road drainage system separate from ditches draining the surrounding embankments. This will probably require a balancing pond with oil interceptor and penstock to prevent spillages contaminating the surrounding water bodies. These significant issues will need to be consulted on with the Environment Agency and the Internal Drainage Board.
- Adjacent to the new link the proposed rail bridge will have to be set back enough to allow the 120m sightline and parapet/safety fencing in front of the abutment/wing-wall.

Three large culverts will be required under the proposed embankment to link the ditches beneath, at least one needing to have a diameter larger than 1.8 m and thus a structure. Also, the Environment Agency may insist on multiple additional smaller culverts to allow water and wildlife egress, plus new ditches at the bottom of one or both sides of the embankment.

The site access may need traffic lighting and a 3m wide haul road is sufficient.

4.3 Rosper Road – Assessment of options

All options will require the Highways Agency, Environment Agency and Internal Drainage Board to be consulted. The Highways Agency will require any subsequent change to their design to be done by their chosen consultant subject to their procedures and timescales. This will then be charged to Able Humber Ports Ltd. Pell Frischmann (the initial consultant on the proposed A160T highways scheme) identified water voles and amphibian habitat in the surrounding ditches and fields.

4.3.1 Rosper Road – road over railway bridge

The practicality of lifting Rosper Road over the railway is subject not only to the engineering issues for the interface between road and railway, but to the progress of the wider highway scheme. It would need a change in the concept of the scheme to one where the existing Humber Road railway over-bridge is widened to a accommodate a dual carriageway with an improved junction between Humber Road and Rosper Road. It would also affect local access to the fire station. The drainage issues would be similar to those for the other option. In addition altering the proposed Rosper Road layout would render the railway scheme liable for the costs of the highway scheme under a Highways Act 1980 Section 278 agreement.

4.3.2 Rosper Road – railway over road bridge

The option with the railway crossing the road is also not without difficulties. Besides the engineering construction issues, the gradients on the new railway are critical. For a heavy freight railway the desirable maximum gradient is 1 in 150. This cannot be achieved.

A satisfactory gradient of 1 in 127, compensated for curvature is achievable with a soffit height of 5.7. This height is recommended to mitigate the risk of bridge strikes.

This will require the hog (or crest) vertical curve for the railway to be on the bridge over Rosper Road. The railway will climb from a new junction near the Conoco Oil Refinery to the road intersection and then drop to the junction with the existing Killingholme Branch line. The gradients are severely affected by the required road to soffit heights.

If Rosper Road is required to convey high loads, then a road to soffit height of 6.45m is required. This is likely to worsen the railway gradients and train performance to the extent that the freight train loads could be reduced for existing traffic or severely constrained for new traffic. At this point the option to lift Rosper Road over the railway should be considered.

The engineering construction issues relate to the difficulty and extent of earthworks required to lift the new railway over Rosper Road. These are discussed below.

However the railway bridge over Rosper Road option effectively avoids complications with the highway layout, de-risking the project. This would be the preferred option, unless the Highways Agency is willing to amend their scheme at nil or low cost to Able Humber Port Ltd.

4.4 Earthworks

Following our visit to the Killingholme chord line site on the 8th November 2012, the geotechnical setting have been reviewed to identify constraints that are anticipated to be relevant to the site. This review has been based around the scheme alignment as discussed on site as illustrated on the drawing B90391-DRG-PWY0001 P05, B90391-DRG-PWY0002 P01 and GIS data sources.

4.4.1 Geology

An assessment of the geological setting has been undertaken based on information publically available, in the form, of the geological map and historic logs held by the British Geological Survey in the general location. In addition, the Client has provided a Ground Investigation report associated with a proposed development on a site adjacent to the proposed route (Biomass Power Station proposal).

The likely ground conditions are summarised below:

- MADE GROUND: Made Ground may be present in localized areas along the route associated with past activities on the site. However, any Made Ground present is likely to be limited in its vertical extent.
- TIDAL FLAT DEPOSITS: Present from Ground Level to in the region of between 3m (north) and 8m (South). Tidal flat deposits are considered likely to be present along the majority of the route, and will likely comprise of a sandy SILT overlain by a firm clay crust,

characteristic of these deposits. Evidence from borehole logs indicates that organic and peat material may be present. Commonly contain a high moisture content.

- GLACIAL TILL: Likely present across the site beneath the Tidal Flat Deposits and above the Bedrock.
- CHALK: Bedrock geology likely present in the region of 12 to 26m below ground level (shallower towards the south)

4.4.2 Geotechnical Constraints

The following geotechnical constraints have been recognized:

- Highly compressible ground (Tidal Flat Deposits)
- Additional loading on the existing earthworks
- Differential settlement at the transition zone (transfer deck) between bridging structures and the embankment, and between the existing earthworks and the new embankment earthworks
- Washout channels at the top of the till creating a greater thickness of the compressible deposits
- Glacial Erratic's present within the Glacial Till could offer obstructions to piling works
- Other geological features which may impact on the design including meta-stable soils in sink holes and the presence of wind blown sands.

4.4.3 Embankment Construction

Settlement associated with the additional load associated with the creation of an embankment on the compressible deposits (Tidal Flat Deposits) could be minimised through the use of: -

- Replacement of soil with lighter alternative products to construct the embankment, including the use of expanded polystyrene (EPS) blocks
- The placement of an engineered Geogrid at the base of the embankment to spread the load and to provide the required stiffness.
- The use of piles or stone columns beneath the embankment to support the embankment and to provide a narrower embankment, due to the potential of peat deposits a grouted stone column solution may be required.

The UIC Code 719R recommends for highly compressible soils with organic content: -

> "Grouted stone columns, premixed and concrete columns: In very soft soil or soil with organic layers columns can be formed by injecting binder into the stone or gravel column. Alternatively pre-mixed materials can be used. To have a proper load distribution among the columns a cap layer with re-inforcement (for example Geogrids) above the columns may be necessary. "
>
> "Lightweight fill materials: When it is necessary either to construct a new line or restore an existing line with a peat subgrade, it is necessary to limit additional loads. This can be achieved by using lightweight material (expanded clay, expanded polystyrene) which is confined by a geotextile and protected by a layer of gravel beneath the ballast layer."

Consideration is required for the placement of an embankment parallel to any drainage ditches, and a stability assessment would be required to assess the impact on the ditch from the addition surcharge associated with the embankment. A structure solution may be more suitable at the interface with the drainage ditch forming part of the Nature Reserve.

4.4.4 Option 1a

Option 1a is built entirely over the Tidal Flat Deposits and will require extensive engineered embankments throughout. It has the advantage of a shorter bridge over Rosper Road. See drawing B90391-DRG-PWY0002 P01 for details.

4.4.5 Option 1b

Where practicable he railway should be constructed on the areas where Glacial Till can provide load bearing and a normal embankment constructed. Glacial Till has good load bearing capabilities. These locations are shown on the British Geological Survey GIS data and the site visit noted a correlation between the GIS data and locations of dense vegetation where Glacial Till was likely to be present near the surface and other locations supporting grasses that may indicate the presence of Tidal Flat Deposits. This will need to be confirmed by borehole data and soil tests.

See drawings B90391-DRG-PWY0001 P05 and B90391-DRG-PWY0005 P01 for details.

Option 1b has been developed to site the railway West of Rosper Road directly on the Glacial Till deposits, thereby allowing normal embankments to be constructed. This is at the expense of a longer viaduct over Rosper Road. East of Rosper Road the route is constructed on Tidal Flat Deposits and follows a similar route to Option 1a.

4.4.6 Foundations

The bridge structures would need to utilise a piled solution as the Tidal Flat Deposits would not provide adequate bearing capacity for shallow foundations. The underlying Glacial Till would be a suitable bearing stratum for the piles. The presence of Glacial Till at a shallow depth than presumed near Rosper Road could remove the need for piles.

4.4.7 Ground Investigation

A ground investigation is required along the proposed route to ascertain the ground conditions at the site. The ground investigation should be designed to prove the thickness of the Tidal Flat Deposits as well as the bearing capacity of the underlying Glacial Till. This should be done early in the design to fully identify the design constraints.

4.5 Underline Structures

4.5.1 Rosper Road

To accommodate the proposed chord linking the Killingholme Branch Lline (KIL2) to the Immingham to Brocklesbury Line a new structure is required to bridge over Rosper Road (OS Ref: TA 171 169).

Rosper Road is a busy carriageway providing access to various oil refinery facilities in the Killingholme area.

Two track alignments have been considered; Option 1a requires a 50 to 55m long under-bridge and Option 1b requires an approximately 150m long viaduct structure.

The normal road to soffit headroom is 5.3m. This would provide a gradient of 1 in 142 on the Western side and 1 in 130 on the Eastern side. However this could be susceptible to bridge strikes. The deck strength would need to be assessed and sacrificial beams may be required over the carriageway.

The new bridge should provide 5.7 metre clear headroom to be deemed unsusceptible to road vehicle impact ("Bridge Strike"). This would avoid the possible need for sacrificial beams. However the compensated gradients would worsen to 1 in 127 on the Western side and 1 in 121 on the Eastern side. These gradients are on the limit of being operable with heavy freight trains. See drawing B90391-DRG-PWY0005 P01 for details.

There is a risk that Rosper Road could be designated a High Load route in which case a 6.45m headroom would be required. There is route indicated by the Highways Agency (HiR22) in the Immingham area and clarification of requirements will need to be undertaken at the next stage of development. This would worsen the gradients still further to 1 in 102 on the Western side and 1 in 98 on the Eastern side. At this point the option to take the road over the railway should be considered.

The gradient of the railway either side of the structure is steep to enable the new track to tie back into the existing railway formation at either end. The ‘construction depth’ is the vertical dimension between the tops of the rails and the bridge soffit and should be kept to minimum to maintain lowest possible track gradients.

Ground conditions throughout the site are variable. The available information shows at the proposed structure location the ground is formed from a thick band of Tidal Flat Deposits overlaying a band of Glacial Till further overlaying chalk. A primary aquifer is contained within the chalk. The Tidal Flat Deposits are structurally weak and therefore the substructure of the bridge will have to be formed on pile foundations socketed in the Glacial Till strata.

It is known that there are numerous services running adjacent to the west side of Rosper Road between the carriageway and the ditch. It is assumed that the cost of diverting these services far outweighs the cost of bridging over them, which is why only a single span option has been considered for Option 1.

4.5.2 Option 1a

To minimise construction depth a transversely spanning composite deck is proposed supported by outer longitudinal main girders. The composite deck is formed from transversely spanning universal columns at 1.5 m centres encased in concrete. The concrete slab is launched between cross girders down to bottom flange level to reduce the deck self-weight. The main girders are formed from steel plate girders – See figure 1.

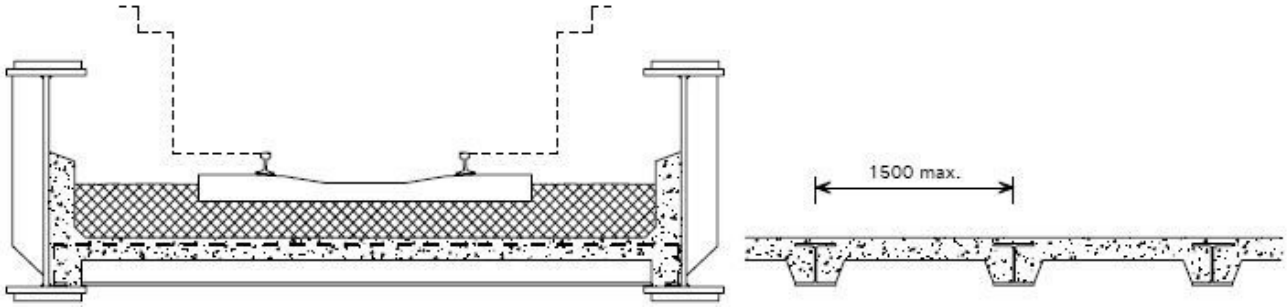

Figure 1: D-type Bridge

The construction depth of this deck will be approximately:

Deck slab = 500mm

Bottom Flange thickness = 100mm

Ballast depth = 300mm (potentially reduced to 200mm)

Typical concrete sleeper and rail = 367mm

Construction Depth = 1267mm (1167 with reduced ballast depth)

The bridge is located in an aggressive atmosphere, in close proximity to the sea and near numerous oil refinery facilities; consideration should be given to using weathering steels to reduce long term maintenance costs.

The bridge could be constructed alongside/near to the existing structure and installed by launching or transporter method. Transporter method is the most cost effective providing an overnight road closure is available.

The abutments of the bridge will be formed from a monolithic 1.2 metre thick cast in-situ reinforced concrete walls, supported off contiguous piled substructure consisting 900mm diameter

piles at 1200mm centres. Cast in-situ reinforced concrete wing-walls will extend from abutments, returning at 45 degrees to retain the earth embankments.

4.5.3 Option 1b

A three span viaduct would be proposed to bridge the approximately 150 metre long void created by Option 1b. A similar deck construction would be utilised as Option 1a, especially over the highway spans where construction depth is critical. Construction depth is not critical over the Eastern span therefore a less onerous cross girder spacing would be adopted in the deck to reduce cost. Accurate and detailed design need to be produced at a later stage.

The piers would be formed from a monolithic 1.2 metre thick cast in-situ reinforced concrete walls, supported off contiguous piled substructure consisting 900mm diameter piles at 1200mm centres.

4.5.4 Combined Accommodation Track and Land Drain Bridge

The proposed works isolate the area of land to the south of the new chord at the east end. An under-bridge is proposed to enable access into this area of land. The bridge is to be combined to carry the new chord over the adjacent land drain as well.

The proposed bridge is to be formed from precast reinforced concrete portal frames. The portals will be supported by contiguous piled walls with a reinforced concrete capping beam. The portal frames will be keyed into the capping beam.

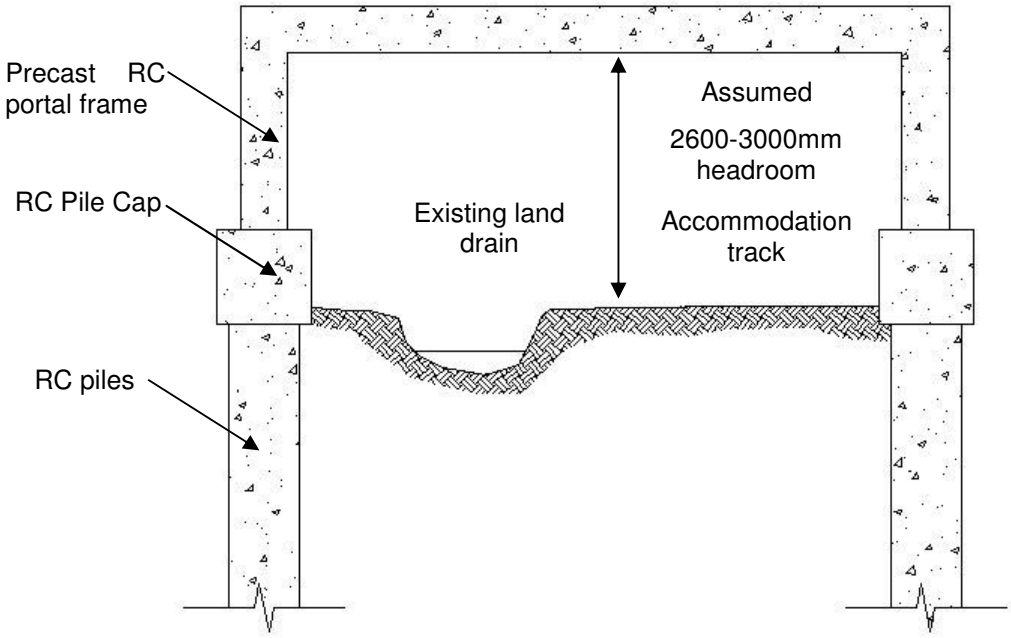

Figure 2: Combined Accommodation Track and Land Drain Bridge

4.5.5 Culverts

East of Rosper Road there are three other drains that will need culverting.

Two drains adjacent to the Nature Conservation site will need concrete pipes or similar to a diameter of 1.8 metres. It may be possible after a hydrological survey to reduce the pipe diameter to 900mm.

The third drain affected is at the junction of the new railway with the Killingholme Branch. The existing 900mm culvert should be extended.

If the chord line facing South is constructed two further drains will need culverting with 1.8m concrete pipes or similar.

4.6 Signalling and Control

At this stage no evaluation of signalling requirements has been undertaken.

However the scheme should provide for an entry and exit signal with overlaps in each direction.

The line should be worked under the Track Circuit Block regulations and controlled from the new Signalling Centre for the North Lincolnshire re-control project.

4.7 Operations

The new line is required to support an alternative access route to the Killingholme Branch. The current Network Rail proposal is to re-instate the Killingholme to Goxhill line with a new Southern chord onto the Ulceby.to Barton line.

The rationale for this is that it will allow an approach to Killingholme from the North allowing an empty coal or biomass train to load at Humber International Terminal without the locomotive having to run round its train before or after loading. This is thought to provide a substantial increase in train paths.

The new line proposed by Able Humber Ports Ltd has as its rationale a lower cost alternative to the Goxhill scheme that delivers substantially the same benefits. The route is considerably shorter and lower cost. It avoids the congested area around Immingham East and West Junctions.

The Southern fork off the new line offers the possibility of a direct link into the Humber International Terminal (HIT) for coal trains.

This could fulfil a substantial role as part of a balloon loop for coal and biomass Merry-Go-Round (MGR) traffic. This would require the existing train load-out facility at Humber International Terminal to be connected onto the new line. Empty trains would arrive via the new line, load and depart via the existing line. Terminal times would be substantially reduced and capacity increased.

Similarly there may be productivity improvements to be gained at Immingham Bulk Terminal for Tata Steel if the load-out facility was aligned with the current Killingholme Branch past the terminal.

This would require a more substantial study to prove the concept.

The construction of the new railway would permit the existing KIL2 section of the Barton and Immingham Light Railway to remain as a Light Railway as it would no longer be required for a future enhancement as a through freight route.

4.8 Environment

4.8.1 Statutory Order

The new railway will require the current Development Consent Order for the Able Marine Energy Park to be amended or a fresh Transport and Works Act Order under the 2013 regulations for railway works under 2 miles length to be procured.

If the current Development Consent Order is amended then the extent to which the supporting Environmental Statement may need to be amended will have to be determined.

If a new Transport and Workss Act Order is procured , then the size and extent of the scheme, as determined by the Town and Country Planning (Environmental Impact Assessment) Regulations (2011), S.I. No. 1824, will likely require an Environmental Impact Assessment (EIA), and subsequent Environmental Statement (ES), as the scheme is over the threshold for railway developments requiring an EIA (development of >1 hectare), stated within Schedule 2, 10(d). This will likely form an integral part of submission of a planning application for the scheme.

It is recommended that in order to determine both the requirement for an EIA, and the scope of what environmental aspects would be required to be included within the assessment, the Local Authority (North Lincolnshire Council) Planning department should be contacted at the earliest stage possible and the Planning Inspectorate consulted.

This would entail requesting both an advisory Screening Decision and an advisory Scoping Opinion for the scheme from North Lincolnshire Council and final decision from the Planning Inspectorate.

It is anticipated that given the location of the scheme, and the surrounding environmental receptors, the aspects that will likely require impact assessment will include, but not necessarily be limited to;

- Ecology and Biodiversity– Impact on surrounding statutory and non statutory nature reserves, impact on legally protected species and associated habitats identified within the local area (Water Voles, Great Crested Newts, wintering birds), impact on biodiversity in the surrounding landscape. The scheme will likely require mitigation measures, translocation/exclusion schemes with seasonal, programming, design and cost implications. Additionally, the direct and indirect impacts upon the adjacent Local Wildlife Site (Rosper Road Pools) will need to be considered and a management plan will likely be required to be implemented both during and after construction.

- Water Resources– The proposed alignment bisects several drainage ditches, is located within an area at risk of flooding and is located directly adjacent to an aquatic nature reserve (see above). As a result, flood risk assessments, drainage impact assessments, design issues, cost implications and impacts on ecology will all require consideration.
- Hydrogeology – the site is underlain by a principle bedrock aquifer and is located in a coastal region, and as such hydrological linkage to the sea may require assessment. This will likely require specific design solutions with agreement from the Environment Agency (with the associated cost implications).
- Archaeology – local archaeological resources are currently unknown but may require assessment. Issues to be considered will be dependant on the design solution and may have programming, design and cost implications.
- Air/Land Pollution – ground conditions within, and adjacent to the proposed scheme will likely need to be assessed, and monitored to ensure no pollution pathways will be affected/created by the scheme. These issues will likely present cost implications to the scheme.
- Transport – the impact of the construction and operation of the scheme on both the rail and road network will likely require assessing to determine the extent of the impact of the scheme on the local transport resources. This will likely require specific design solutions with agreement from the North Lincolnshire Council Highways Department, Highways Authority and Health and Safety Executive (with the associated cost and programming implications).
- Visual – The potential to impact on the surrounding landscape – the extensive proposed structure will be sited within a flat receiving environment which will be visible from a potentially significant distance. A Landscape impact assessment may be required.
- Climate Change – the impact of both the design and the construction of the scheme will require assessment.
- Sustainability – A scheme of this magnitude has the potential to impact on material use and transportation issues through design. Construction impacts should also be considered during the design phases.

These aspects will need to be assessed with respect to the environmental impact of both the construction and the operation of the proposed scheme.

It is probable that, following the screening process, the development will require an Environmental Statement. The Environmental Impact Assessment of the scoped environmental aspects (most notably ecology, water resources, hydrogeology and Transport) will likely require a significant volume of baseline survey work to inform the assessment. This survey work will likely have seasonal requirements, and may be required to be programmed over a calendar year, or longer, imposing significant programming issues with regard to securing planning permission prior to the construction of the scheme.

As such, it is critical for the progression of this scheme that a screening decision is obtained and the environmental aspects are scoped by the local planning authority at the earliest stage possible.

4.8.2 Consents, Licences and Consultation

Outside of the likely requirement for an EIA as part of securing the Development Consent Order for the scheme, it is anticipated that several consents and licences will be required from the statutory authorities for the scheme to proceed. As part of these consents and licences requirements, additional survey and assessment work may also be required.

Consents and licences that would likely be required include: -

- Protected species licences (e.g. European Protected Species (EPS) mitigation licences for Great Crested Newts, Water Vole exclusion/translocation licences) from Natural England
- Environment Agency/ Internal Drainage Board consents with respect to alterations to the local drainage ditch network
- Consent from the Environment Agency with respect to development within an area at risk of flooding/ over a Principle Aquifer
- North Lincolnshire Council Highways Department/ Highways Agency will require being consulted/involved for the proposed alterations to the local road network.
- English Heritage/ North Lincolnshire Council Archaeology Department should be consulted to determine the extent of archaeological resources

As previously discussed, the survey works for these consents/licences will likely have specific seasonal requirements which would likely impact upon the design/construction programme for the scheme.

On initial costing Option 1b is the preferred option, but this will need to be confirmed by ground investigations and local survey. The length of the chord line is 1625 metres in the feasibility railway design. The costs of the new chord are preliminarily estimated at £38 million including contingency.

A comparison should be made with the original 2008 proposal to reinstate the closed KIL3 section of the Barton and Immingham Light Railway with a chord line at Goxhill, but without any upgrade to the section to Thornton Abbey of the Ulceby to Barton Line. The estimated costs, for the preferred Option C adjusted for inflation to Q4 2012 are £41m. It was considered at the time that any upgrade to the Ulceby to Thornton Abbey section could cost a further £15m, though no detailed work was undertaken on that.

The new shorter Rosper Road Loop will require the current Development Consent Order for the Able Marine Energy Park to be amended or a fresh Transport and Works Act Order under the 2013 regulations for railway works under 2 miles length to be procured.

4.9 Cost Estimates

On initial costing Option 1b is the preferred option, but this will need to be confirmed by ground investigations, bridges design and local survey. The length of the chord line is 1625 metres in the feasibility railway design. The costs of the new chord are preliminarily estimated at £38.3 million including contingency.

Option 1a is estimated to cost £44.7 million due to traversing poor ground.

A comparison should be made with the original 2008 proposal to reinstate the closed KIL3 section of the Barton and Immingham Light Railway with a chord line at Goxhill, but without any upgrade to the section to Thornton Abbey of the Ulceby to Barton Line. The estimated costs, including contingency, adjusted for inflation are £35 million for the short option A, £41 million for the longer (preferred) option C, £42.5 million for the longest option B, £56 million for the looping option D. Note that the figures above are high-level estimates.

It was considered at the time that any upgrade to the Ulceby to Thornton Abbey section could cost a further £15m, though no detailed work was undertaken on that.

5.0 Conclusions

The new Rosper Road Loop (in the parish of South Killingholme), can be engineered and constructed. Option 1b is the most cost-effective solution.

The crossing of Rosper Road can be undertaken by lifting the new railway over the road. The alternative of raising Rosper Road and the consequent alterations to the A160 highway scheme should only be considered if Rosper Road is required for High Loads with the consequent raising of the soffit level and worsening of the railway gradients.

The key risks to the scheme arise from the poor ground conditions making earthworks more complex.

The operating benefits of the scheme are in providing a direct access to the Humber International Terminal for coal and biomass trains, thereby nullifying any strategic requirement for the KIL3 line from Killingholme to Goxhill.

6.0 Recommendations

The development of the interface between the new railway and the HIT terminal should be investigated further with Network Rail and ABP. Similarly the provision of facilities at Immingham Bulk Terminal may need to be considered.

The Rosper Road Loop scheme should be supported on the basis that it offers a more readily constructible alternative to the Goxhill scheme and the strategic benefit of diverting future railway growth away from the AMEP site.

Appendix A: Drawings

Option 1a and 1b.

KEY

- NEW TRACK ALIGNMENT
- WATER, DRAINS, RIVERS, CANALS
- PIPELINE
- LEVEL CROSSING
- AGRICULTURAL LAND GRADE 3
- URBAN LAND
- CHALK BURNHAM FORMATION
- CHALK FLAMBOROUGH FORMATION
- MADE GROUND (ARTIFICIAL DEPOSIT)
- TIDAL FLAT DEPOSITS
- TILL DEVENSIAN
- OPERATIONAL AREA OF THE PORT OF IMMINGHAM BOUNDARY
- NORTH LINCOLNSHIRE LOCAL PLAN. LC4 - SITE OF IMPORTANCE FOR NATURE CONSERVATION
- PROPOSED HIGHWAY ALTERATIONS
- INDICATIVE CONNECTIONS FOR C.GEN AND HIT

Letter	Date	Descriptions of revision	Des.	Chkd.	Appr.
P05	20/09/13	FINAL ISSUE. TYPOS CORRECTED	VR	HP	HP
P04	20/11/12	DETAILS AND NOTES ADDED. ISSUED	KB	HP	HP
P03	15/11/12	DRAFT ISSUE FOR INFORMATION	KB	DW	
P02	07/11/12	NEW HIGHWAY AND TOPO ADDED	VR		
P01	16/10/12	ISSUED FOR INFORMATION	PRH	VR	

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Status

PRELIMINARY

Designed	Checked
K.BANCROFT	H.PACK
Approved	**Date**
H.PACK	20/11/2012

KILLINGHOLME PORT RAIL ACCESS

CONSTRAINTS DRAWING OPTION 1B

Scales 1:1000 — CAD VR

PW Workflow State: Unchecked

Drawing Number: B90391-DRG-PWY0001 — Revision: P05

DO NOT SCALE

©

KEY

NEW TRACK ALIGNMENT	
WATER, DRAINS, RIVERS, CANALS	
PIPELINE	
LEVEL CROSSING	
AGRICULTURAL LAND GRADE 3	
URBAN LAND	
CHALK BURNHAM FORMATION	
CHALK FLAMBOROUGH FORMATION	
MADE GROUND (ARTIFICIAL DEPOSIT)	
TIDAL FLAT DEPOSITS	
TILL DEVENSIAN	
OPERATIONAL AREA OF THE PORT OF IMMINGHAM BOUNDARY	
NORTH LINCOLNSHIRE LOCAL PLAN. LC4 - SITE OF IMPORTANCE FOR NATURE CONSERVATION	
PROPOSED HIGHWAY ALTERATIONS	

Letter	Date	Descriptions of revision	Des.	Chkd.	Appr.
P01	20/11/12	NEW DRAWING CREATED FROM PWY0001 P02. DETAILS AND NOTES ADDED. ISSUED	VR	HP	HP

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Designed	Checked
V.RANGELOV	H.PACK
Approved	**Date**
H.PACK	20/11/2012

KILLINGHOLME PORT
RAIL ACCESS

CONSTRAINTS DRAWING
OPTION 1A

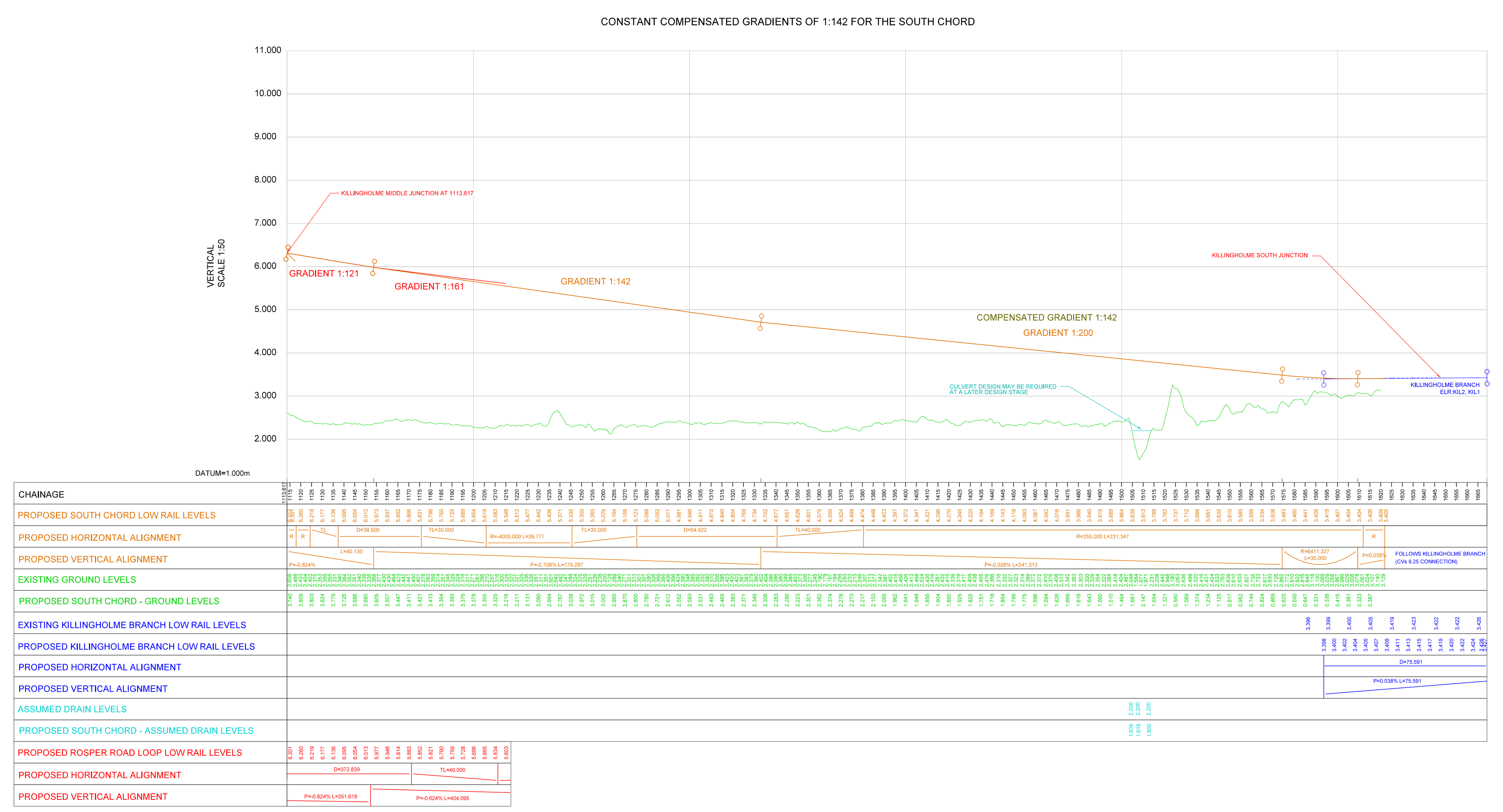
Scales	1:1000	CAD	VR
PW Workflow State	Issued		
Drawing Number	B90391-DRG-PWY0002	Revision	P01

DO NOT SCALE

B90391-DRG-PWY0005

CONSTANT COMPENSATED GRADIENTS OF 1:121 WEST SIDE OF ROSPER ROAD

CONSTANT COMPENSATED GRADIENTS OF 1:142 FOR THE SOUTH CHORD



NOTES

1.
THE ORIGINAL MASTER SIGNED COPY OF THIS DRAWING IS KEPT AT TATA STEEL PROJECTS, YORK OFFICE FOR AUDIT PURPOSES.

2.
ASSOCIATED DRAWINGS / REPORTS:-
B90391-DRG-PWY0001 CONSTRAINTS DRAWING OPTION 1B
B70193-MOD-SVY0006 TOPOGRAPHICAL SURVEY MODEL
A90863 001.DWG TOPOGRAPHICAL SURVEY
B90391-REP-TPL0001 ROSPER ROAD LOOP. FEASIBILITY STUDY

3.
CHAINAGES AND LEVELS ARE SHOWN IN METRES.

4.
THIS DESIGN IS BASED UPON SEVERAL SOURCES OF INFORMATION : ORDNANCE SURVEY, LIDAR AND TOPOGRAPHICAL SURVEYS.

5.
A NEW SURVEY IS TO BE UNDERTAKEN PRIOR TO THE NEXT STAGE OF WORKS.

6.
LIDAR DATA WAS PROVIDED FOR THE AREA BETWEEN THE TWO RAILWAY LINES. POSITION OF ROADS, DRAINS AND GAS PIPES IS SHOWN INDICATIVELY AND NEEDS CONFIRMATION BY SURVEY.

7.
CHAINAGE IS SHOWN FROM THE HUMBER COMMERCIAL RAILWAY (ELR:BRI2) IN METRES AND INCREASES TOWARDS KILLINGHOLME BRANCH (ELR:KIL2). THE DATUM IS 15.078m AT THE TOES OF THE PROPOSED NR60E SWITCH (KILLINGHOLME WEST JUNCTION).

8.
THE PROPOSED VERTICAL ALIGNMENT GEOMETRY DETAILS ARE RELATIVE TO THE SHOWN CHAINAGES. ONLY THE EXISTING RAILWAY PART OF THE ALIGNMENT WAS SURVEYED.

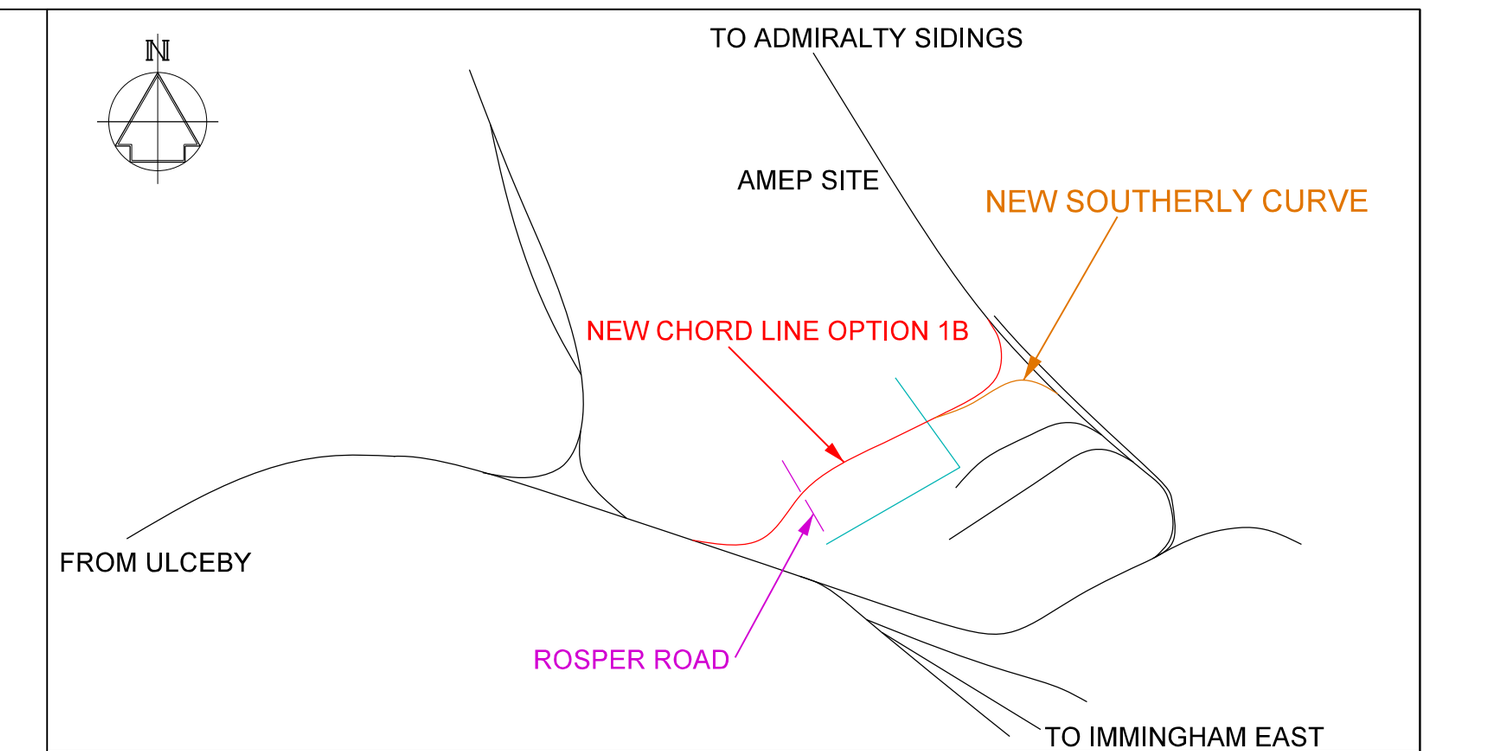
9.
EXISTING GROUND LEVELS SHOWN THUS:
EXISTING RAIL LEVELS SHOWN THUS:
INDICATIVE DRAIN/WATER LEVELS SHOWN THUS:
PROPOSED CHORD LINE RAIL LEVELS SHOWN THUS:
PROPOSED SOUTHERLY CURVE RAIL LEVELS SHOWN THUS:

VERTICAL TANGENT POINTS SHOWN IN SECTION THUS:

10.
RAIL LEVELS ARE QUOTED FOR THE LOW RAIL, UNLESS STATED OTHERWISE.

11.
MODEL IS SAVED IN N:\PROJECTS\B903xx\B90391-00FB Able UK - Killingholme Port Rail Access\Track\MX\Killingholme.mmd

12.
ALL STRUCTURES CONSTRUCTION DEPTHS ARE CONTAINED IN B90391-REP-TPL0001 ROSPER ROAD LOOP. FEASIBILITY STUDY AND WILL BE DEVELOPED IN MORE DETAIL AT FUTURE DESIGN STAGES.



LOCATION DIAGRAM

Rev.	Date	Descriptions of revision	Des.	Chkd.	Appr.
P01	14 10 13	PRELIMINARY ISSUE. FOR DISCUSSION	VR	GKW	GKW

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Status: PRELIMINARY

Designed	Checked
V.RANGELOV	G.WARREN
Approved	**Date**
G.WARREN	14/10/2013

KILLINGHOLME PORT RAIL ACCESS

PERMANENT WAY
LONGITUDINAL SECTION
OPTION 1B

Scales: 1:1000 1:50 — CAD: VR

PW Workflow State: Internally Approved

DO NOT SCALE

Drawing Number: B90391-DRG-PWY0005 — Revision: P01

Appendix B: Risk Register

TATA STEEL

CONSTRUCTION (DESIGN & MANAGEMENT) REGULATIONS 2007

Designer's Health & Safety Risk Review

Document Reference Number:	B90391-RAS-PEN0001	**Version**	P01
Project Number:	B90391	**Applicable from Stage:**	Design
Project Title:	Rosper Rail Loop		
Client:	ABLE UK Ltd		
CDM Co-ordinator (Organisation & Contact Name)	ABLE UK; to be confirmed		
Designer (Organisation & Contact Name)	Tata Steel Projects, Dave White		
Is the Structure to be used as a workplace?:	No		
(if yes, the design to take into account provisions of Workplace (Health, Safety and Welfare) Regulations 1992 and the 2002 amendments			

I have reviewed the attached list of residual risks and identified those which are significant and included them in the Designer's Risk Log/Pre-Construction Information. These risks cannot be reasonably designed out.

The following Disciplines/Designers pro-actively contributed to the risk elimination, reduction and control on this project:

Discipline	Assessment Number	Discipline	Assessment Number
Bridges & Infrastructure	no. 1 - no. 5		
Environmental	no. 6 - no. 9		
Track & Transport Planning	no. 10 - no. 19		
Geotechnical	no. 20 - no. 21		

DESIGNERS RISK LOG	B90391 Rosper Rail Loop												
Hazard Ref No.	**Category**	**Risk Description**	**Frequency**	**Severity**	**Significance H, M, L**	**Design Control Action**	**Frequency**	**Severity**	**Significance H, M, L**	**Progress**	**Information Transmission Route**	**Residual Risk Action Owner**	**Comments**	**Risk Type**
Overall Risks Options 1A and 1B														
1	Construction	Potential Bridge strike.	5	4	H	Lower existing highway/increase railway elevation.	2	1	L	Open		Contractor		CDM H&S
2	Construction	Differential settlement of bridge against embankment.	4	4	H	Ensure design has sufficient transition between the two structures	2	2	L	Open		Contractor		CDM H&S
3	Maintenance	Very costly relocation.	3	3	M	Ensure close liaison between asset owners is maintained.	2	1	L	Open		Contractor		Project
4	Maintenance	Very costly relocation.	4	3	H	Ensure close liaison between asset owners is maintained. Can pipe be relocated during a maintenance period?	2	1	L	Open		Maintainer		Project
5	Construction	Incur additional costs and delays	3	4	H	Conduct utilities/services search and mapping.	1	2	L	Open		Contractor		CDM H&S
6	Construction	Higher water table/instability of embankment and localised flooding and ecological impacts and associated mitigation. Project/Programme Delay and high additional costs.	3	5	H	Ensure embankment design and loading does not have any impact on existing drainage and wet land habitats.	2	5	M	Open		Client		Project
7	Construction	Project/Programme Delay and high additional costs	3	5	H	Environmental assessment and determination of appropriate mitigation measures to be undertaken prior to design/construction works	3	3	M	Open		Client		Project
8	Construction	Approval of scheme by Local Planning Authorities. Significant programming and cost implications	4	5	H	Liase with Planning authorities at earliest stage possible to understand planning requirements	2	4	M	Open		Client		Project
9	Construction	Approval of scheme by Statutory Authorities. Project/Programme Delay , high additional costs and Public Inquiry	3	5	H	Liaise with Statutory authorities at earliest stage possible to understand scheme constraints/limitations and requirements. Consultation strategy to be developed	2	5	M	Open		Client		Project
10	Construction	Stop, delay or incur additional costs to the project	3	5	H	Obtain early agreement between all stakeholders	2	4	M	Open		Client		Project

11	Operations	Axle-loads heavier than 25.5 tonnes can be introduced in future on this line. That will put extra stress on the rails.	3	3	M	Design using CEN60 rail (60 kg/m) and S&C. Provide dense sleeper spacing.	3	1	L	Open		Client		Project
12	Construction	Incur unexpected costs and possible delays	2	3	L	Conduct a survey and ground investigation prior to final design	1	2	L	Open		Contractor		Project
13	Construction	Project/Programme Delay and high additional costs	2	4	M	Obtain agreement between all parties	1	4	L	Open		Client		Project
14	Operations	Additional costs, possible delays	1	3	L	Start planning in advance	1	1	L	Open		Operator		Project
15	Construction	Will require additional cost and railway possessions	2	3	L	Establish if faster crossover is necessary	1	2	L	Open		Client		Project
16	Operations	Weigh-bridge will limit gradients, may be the capacity of the new railway	3	3	M	Negotiations on connections, requirements and design	3	3	M	Open		Client		Project
17	Operations	Increased clearance will degrade the railway's maximum trailing load and achievable speed. Limit the number of trains	3	4	H	Build gentle railway gradients, lower the road level, vertical curve over the bridge and wide horizontal curves	1	3	L	Open		Operator		Project
18	Construction	Project/Programme Delay and additional costs	2	3	L	Establish requirements before design	1	2	L	Open		Contractor		Project
19	Construction	Project/Programme Delay and additional costs	2	3	L	Assess the existing signalling	1	1	L	Open		Contractor		Project
Additional Risks for Option 1B B90391-DRG-PWY0001 P04														
20	Construction	Further encroachment onto Wet land and existing drainage. Localised flooding	3	3	M	Ensure a detail Ground Investigation is carried out prior to design works to ensure correct solution is provided.	1	2	L	Open		Client		Project
21	Construction	Incorrect solution for embankment designed	3	3	M	Ensure Detailed G.I. is carried out prior to design to ensure correct solution is provided	1	3	L	Open		Contractor		Project

RISK MATRIX

Risk Assessment process requires an examination of the workplace to establish what could cause harm to people. The Risk Matrix is designed to help the assessor to weigh up whether enough precautions have been taken or if more needs to be done to control the risks.

It should be noted that this method of rating risks is very subjective, based on a broad judgement of the values attached to frequency and severity. However, it does provide a practicable method of prioritising or rating risks and give an overall score.

Frequency of an Accident Occurring		Severity of Consequences	
1.	highly improbably	1.	minor injury, no time off
2.	remotely possible but know to occur	2.	injury resulting in up to 3 days off
3.	infrequent	3.	injury resulting in 3 or more days off
4.	occasional	4.	major disability (eg loss of limb, eye, etc)
5.	frequent and regular	5.	fatality

Overall Risk Rating

		Severity				
		5	4	3	2	1
Frequency	5	25	20	15	10	5
	4	20	16	12	8	4
	3	15	12	9	6	3
	2	10	8	6	4	2
	1	5	4	3	2	1

RISK (HAZARD RATING) = FREQUENCY x SEVERITY

This gives a matrix of possible rating values as follows:-

The rating values can then be grouped into three broad classes of risk:-

Critical Risks	15-25
Significant Risks	8-12
Minor Risks	1-6

Appendix C: IDC Certificate

TATA STEEL

TATA

Inter-Disciplinary Check Certificate

Certificate Number:	**B90391-IDC-PEN0001**		
The documents listed below have been subject to an Inter Disciplinary Design Check (IDC) by the undersigned checking disciplines, and have been found acceptable			
Client:	ABLE UK Ltd	**Client Project Ref:**	B90391
Project Title:	**Killingholme Port Rail Access**		

Document No.	**Rev No.**	**Document Title:**
B90391-DRG-PWY0001	P04	CONSTRAINTS DRAWING , OPTION 1B
B90391-DRG-PWY0002	P01	CONSTRAINTS DRAWING , OPTION 1A
B90391-EST-COM0001	P03	Two Options Cost Estimate
B90391-RAS-PEN0001	P01	RISK REGISTER – MULTI-DISCIPLINE

Checking Discipline	**Checking Organisation**	**Name of CRE**	**Signature of CRE**	**Date**
Track	Tata Steel Projects	Dave White		05/12/12
Geotechnical	Tata Steel Projects	Matthew Bickley		05/12/12
Transport Planning	Tata Steel Projects	Vladimir Rangelov		05/12/12
Highways	Tata Steel Projects	Liam Bradley		05/12/12
Civils / Bridges (Ancillary/Drainage)	Tata Steel Projects	Peter Mullen		05/12/12
Environmental	Tata Steel Projects	Richard Seabrook		05/12/12
We confirm that we have satisfactorily completed IDC on the above documents				

Preparing Discipline:	**Preparing Organisations Name:**	**Name:**	**Signature:**	**Date:**
Track	Tata Steel Projects	Dave White		06/12/12
I confirm that the IDC process on the above documents is complete in line with the IDC Procedure		**Name:**	**Signature:**	**Date:**
		D White		06/12/12

Appendix D: Estimates

Project Title Rosper Rail Loop
Job Description Two Options
Tata Estimate Nr. B90391-EST-COM0001 **Revision** P03 **Estimate Stage**
Estimate Date 03-Dec-12 **Costed at** 4Q2012 **Confidence** +/-50%

Estimate Breakdown		Option 1B	Option 1A	Option 3	Option 4	Option 5
Contractor's direct costs -						
Signalling		1,677,400	1,677,400			
AV/DC Electrification		-	-			
Permanent Way		2,417,800	2,398,806			
Telecoms		81,000	81,000			
Operational Property		-	-			
Structures		6,900,000	2,710,000			
General Civils		8,760,480	16,272,980			
Utilities		100,000	100,000			
Level Crossings		-	-			
Other		-	-			
Contractor's Base Construction Cost inc OH&P: Sub-Total A		19,936,680	23,240,186	-	-	-
Network Rail's "direct costs"						
NDS - Materials		incl. in rates	incl. in rates	incl. in rates	incl. in rates	incl. in rates
NDS - Fleet		incl. in rates	incl. in rates	incl. in rates	incl. in rates	incl. in rates
- Engineering trains		incl. in rates	incl. in rates	incl. in rates	incl. in rates	incl. in rates
- Tampers		incl. in rates	incl. in rates	incl. in rates	incl. in rates	incl. in rates
NDS - Possession / Isolation Management		incl. in rates	incl. in rates	incl. in rates	incl. in rates	incl. in rates
Sub - Total B		-	-	-	-	-
Total Base Construction Cost inc OH&P: Sub-Total C (A+B)		19,936,680	23,240,186	-	-	-
Contractor's indirect costs						
Preliminaries	(Note 1)	4,247,996	4,908,697	-	-	-
Design	(Note 1)	2,252,748	2,733,348	-	-	-
Testing & Commissioning	(Note 1)	332,244	331,674	-	-	-
Training						
Spares						
Other						
Sub - Total D		6,832,988	7,973,720	-	-	-
Total Construction Cost E (C+D)		**26,769,668**	**31,213,906**	**-**	**-**	**-**
Network Rail's indirect & other costs						
Allowance for Network rail charges	2.0%	535,393	624,278	-	-	-
Project Management, (remaining costs)	(Note 1)	-	-	-	-	-
Compensation charges (TOC & FOC)	0.3%	80,309	93,642	-	-	-
TWA Charges		-	-	-	-	-
Land / Property Costs & compensation		-	-	-	-	-
Sponsor	(Note 1)	-	-	-	-	-
Sub - Total F		615,702	717,920	-	-	-
Point Estimate - Sub - Total G (E+F)		**27,385,370**	**31,931,826**	**-**	**-**	**-**
Uplift for Risk and Contingency						
To Mean	£					
Project Budget (Point Estimate + Uplift to Mean)		27,385,370	31,931,826	-	-	-
QRA Value - at P50	£					
QRA Value - at P80 - incremental on P50	£					
Adjustment for residual factors %						
or Contingency allowance	40%	10,954,148	12,772,730	-	-	-
Project Anticipated Final Cost (AFC)		38,339,518	44,704,556	-	-	-
Other Costs to the Customer						
Allowance for Escalation		-	-	-	-	-
Allowance for Network Rail Fee Fund						
Allowance for Industry Risk Fund						
Allowance for Insurance Top-up						
Cost to Customer		**38,339,518**	**44,704,556**	**-**	**-**	**-**

Notes:-
Note 1: refer to assuptions and comments sheets for values used in the claculation of Contractors and Network Rail's Indirect Costs.

ASSUMPTIONS AND COMMENTS			
Project Title / Location	**Rosper Rail Loop**		
Corus Estimate No.	B90391-EST-COM0001	**Revision**	P03
Estimate Date	03-Dec-12	**Costed at**	4Q2012

CALCULATION OF INDIRECT COSTS

The following values have been used for calculation of Contractors and Network Rail's Indirect Costs:

Asset	Preliminaries	Design	Test & Commission	Network Rail Management	Sponsor
Signalling	35%	15%	15%		
AV/DC Electrification	20%	10%	15%		
Permanent Way	20%	10%	3%		
Telecoms	25%	10%	10%		
Operational Property	15%	8%	0%		
Structures	20%	10%	0%		
General Civils	20%	12%	0%		
Utilities	25%	10%	0%		
Level Crossings	25%	12%	10%		
Other	25%	10%	10%		

User note: Any values entered above will be carried to the estimate summary.

GENERAL

The estimates are based on information contained in:

Drawing / report ref.	Version	Title
B90391-DRG-PWY0001	P04	Constraints Drawing Option 1B
B90391-DRG-PWY0002	P01	Constraints Drawing Option 1A

ASSUMPTIONS

A1 Currently no investigation into the signalling requirements, therefore the signalling costs are provisional at this stage allowing for 4nr (3 aspect) coloured light signals. Allowances for the following have also been made:
Upgrading the existing power supplies - £100K
Modifying interlockings - £100K (assumed not SSI)
Panel alterations - £50K

A2 Provisional allowances have been made for the following signalling equipment based on the following assumptions.
Track circuits 2nr per signal plus 1 per point end.
SPT 1nr per controlled signal.
Location case 1 per signal plus two per point end.
AWS 1nr per controlled signal.
TPWS 1nr per controlled signal.

A3 Assumes no work required to private level crossing at northern end of the site.

A4 An allowance has been made for works to existing embankments at the western connection points to avoid differential settlement. Further investigation will be required to determine the extent of the works, however an allowance of £204K has been made at this stage.

A5 An allowance of £100K has been made for the lowering of an existing gas pipe under the new railway embankment.

A6 An allowance has been made for Network rail charges based on the project being undertaken as a 3rd party scheme.

A7 Option 1B new embankments will be required to the new chord connection. These have been split into two types, as follows:
Conventional Embankments - these are located to the western side of the 150m bridge on the assumption that sufficient ground bearing capacity is available from the existing glacial till. This type of embankment will be formed using selected subsoil layers.
Engineered Embankments - these are located to the eastern side of the 150m bridge on the assumption that insufficient ground bearing capacity is available from the existing tidal flats, which are built up of highly compressible soils. This type of embankment will be supported on stone columns and formed using a geogrid base layer and lighter embankment fill (i.e. expanded clay)

A8 All new embankments to Option 1A to the eastern and western side of the bridge (over Rosper Road) will be engineered embankments as detailed above.

A9 Option 1A allows for a 50m underbridge crossing Rosper Road.

A10 All embankments are have been broken down into average heights and are approximate at this stage.

A11 Replacement DV crossover is excluded from the estimate, but has been included as a risk item (see Project Risks sheet).

EXCLUSIONS

E1 TWA Charges
E2 Land / Property Costs & compensation
E3 Sponsor costs
E4 Allowance for Escalation
E5 Allowance for Network Rail Fee Fund
E6 Allowance for Industry Risk Fund
E7 Allowance for Insurance Top-up
E8 Road bridge over closed Level Crossing
E9

PROJECT RISK			
Project Title / Location	**Rosper Rail Loop**		
Tata Estimate No.	B90391-EST-COM0001	**Revision**	P03
GRIP Stage			

Estimating Risk Register

The estimating risk register identifes any risks to the project and/or estimate identified in preparing the estimate; this is to inform the QRA process only and any potential cost impacts will not impact on the estimate total.

Any assessment of the level of cost impact (by percentage/ H/M/L assessment / cost value or range) is a subjective assessment only.

Ref	Risk Type	Description	Probability	Potential Cost Impact
1	Civils	Conventional embankment to west of Rosper Road needs to be confirmed, as further investigation is required to glacial till boundary.	50%	
2	Track	Potential for Rosper Road to be designated a high load route requiring greater headroom to the underside of the railway bridge. Consequently the required railway gradients may not be achievable.	50%	
3	Track	Replacement of existing trailing crossover - Ulceby Line	30%	
4				
5				
6				
7				
8				
9				
10				
11				
12				

CONFIDENCE LEVEL MATRIX

Asset	Scope confidence	Price confidence	Risk confidence
Signalling	**Low**	**Poor**	
E&P	**NA**	**NA**	
Track	**Low**	**Poor**	
Telecoms	**Low**	**Poor**	
OP Property	**NA**	**NA**	
Structures	**Low**	**Poor**	
General Civils	**Low**	**Poor**	
Utilities	**Low**	**Poor**	
Remarks			
Notes:			
Scope Confidence: High = good confidence scope will not change significantly; Medium = Limited scope growth predicted; Low = scope may grow significantly#			
Price confidence: Good = we have good cost knowledge; Poor = poor cost knowledge and/or price certainty			

OPTION SUMMARY

Project Title / Location	**Rosper Rail Loop 1B**		
Option	B90391-EST-COM0001		
Corus Estimate No.	03-Dec-12	**Revision**	P03
Estimate Date		**Costed at**	4Q2012

section	item	quant	unit	rate	total	Comments
Signalling						
Priced on SEU						
	Signalling Equivalent Units		nr		-	inc T&C & design
	Comprising: Xnr signals, Xnr point ents, Xnr Interlocking alts, Xnr TPWS, Xnr IBJ's/TC					
Elemental pricing						exc T&C & design
	Recoveries		%		-	
	Modify route interlocking	1	Sum	100,000.00	100,000	Allowance Only
	VDU / Panel modifications	1	Sum	50,000.00	50,000	Allowance Only
	Signals: 3 Aspect; controlled.	4	nr	49,000.00	196,000	
	Signals: Banner repeater		nr		-	
	Signals: Subsidiary on same post	2	nr	13,000.00	26,000	
	Signals: Route indicator	4	nr	12,000.00	48,000	
	R/A Off Indicator (incl. plunger)		nr		-	
	Switch heating - point end equip	5	nr	7,600.00	38,000	
	Switch heating - control cabinet	4	nr	13,000.00	52,000	
	Switch heating - power supplies	2	nr	11,000.00	22,000	
	Switch heating - transformer	6	nr	2,200.00	13,200	
	Track Circuit	10	nr	13,000.00	130,000	
	Alts to track circuit lengths		nr	4,900.00	-	
	TPWS	6	nr	18,000.00	108,000	
	AWS - magnet		nr		-	
	AWS (bi directional) complete	6	nr	25,000.00	150,000	
	Location Case & Base	16	nr	13,000.00	208,000	Allow 1 per signal & 2 per point end
	Lineside trough; C/1/9	2000	m	76.00	152,000	
	Lineside trough; C/1/43		m		-	
	UTX (2 track inc 2nr TC)	2	nr	17,500.00	35,000	10.5m long
	Cable: Power	3000	m	20.00	60,000	
	Cable : 48c multicore	3000	m	50.00	150,000	
	Sign: Speed signs (reflective)	16	nr	700.00	11,200	3nr per T/O & 4 per X/O
	Telephones: PZT		nr		-	
	Telephones: SPT inc drivers walkway	4	nr	7,000.00	28,000	
	Upgrade to existing power supplies	1	sum	100,000.00	100,000	Allowance Only
	others..please state		x		-	1,677,400
Electrification						
	Not Applicable				-	-
P-way						
Removals	Removal of plain line	200	m	38.00	7,600	
	Removal of S&C units - Crossover	1	nr	10,000.00	10,000	
	Removal of bufferstops		nr		-	
					-	
Slew / lift / lower						
			shift		-	
	Slew n.e. 25mm		m		-	check is not less that min shift
	Slew n.e. 50mm		m		-	check is not less that min shift
	Slew n.e. 100mm	150	m	82.00	12,300	check is not less that min shift
	Slew n.e 200mm		m		-	check is not less that min shift
	Take-up and relay	158	m	310.00	48,980	
	Additional ballast for slews		m3		-	
	Take up & relay S&C		nr		-	
	lift		Sum		-	use elemest sheet
	lower		Sum		-	use elemest sheet
	others..please state		x		-	
New			m		-	
	Plain line (CEN56; 200mm)	160	m	810.00	129,600	On NR infrastructure
	Plain line (CEN56; 200mm)	1800	m	567.00	1,020,600	On 'Greenfield' land
	E/O for Geotech & Sand blanket	1960	m	82.00	160,720	
	Track drainage		m		-	inc catch pits at 25m centres
	S&C turnouts CV9.25	2	nr	240,000.00	480,000	On NR infrastructure. Incl. point motors.
	S&C turnouts EV	1	nr	380,000.00	380,000	On NR infrastructure. Incl. point motors.
	S&C turnouts CV9.25	1	nr	168,000.00	168,000	On 'Greenfield' land. Incl. point motors.
	S&C crossover		nr		-	
	Bufferstop fixed		nr		-	
	Bufferstop sliding		nr		-	
	Saving for re-use of materials		m		-	
	others..please state		x		-	2,417,800
Telecoms						
	CIS screens		sum		-	includes control equipment
	PA speakers		sum		-	includes control equipment
	CCTV cameras		sum		-	includes control equipment
	Cable: Telecoms 30 pair	3000	m	17.00	51,000	
	Cable: Fibre Optic 24 core		m		-	
	Lineside trough; C/1/9		m		-	In Signalling
	UTX (2 track inc 2nr TC)		sum		-	
	Control cabinet		nr		-	

OPTION SUMMARY

Project Title / Location	**Rosper Rail Loop 1B**		
Option	B90391-EST-COM0001		
Corus Estimate No.	03-Dec-12	**Revision**	P03
Estimate Date		**Costed at**	4Q2012

section	item	quant	unit	rate	total	Comments
	Upgrade to concentrators	1	sum	30,000.00	30,000	Allowance Only
					-	81,000
Operational Property						
	Not Applicable					
Bridges						
	Under Bridge - 150m (4 span)	1	sum	6,330,000.00	6,330,000	Single track. Incl. piling allowance
	Under Bridge - 6m (single span)	1	sum	570,000.00	570,000	Single track. Incl. piling allowance
					-	
					-	
					-	6,900,000
Civils						
	Site Clearance - General	34190	m2	0.80	27,352	Small bushes and shrubs
	E/O Shrub clearance (20%)	6838	m2	0.83	5,676	standard price based on large area
	E/O Tree clearance (5%)	1710	m2	2.90	4,958	standard price based on large area
	New Conventional Embankment	335	m	4,300.00	1,440,500	8.3m High
	Engineered Embankment	210	m	8,900.00	1,869,000	6.0m High
	Engineered Embankment	180	m	6,500.00	1,170,000	5.0m High
	Engineered Embankment	76	m	3,750.00	285,000	3.5m High
	Engineered Embankment	453	m	2,275.00	1,030,575	2.5m High
	Engineered Embankment	80	m	1,675.00	134,000	2.0m High
	Engineered Embankment	306	m	720.00	220,320	1.0m High
	Stone Columns	3026	nr	600.00	1,815,600	450dia x average 5m deep
	Existing embankments - Geotech work	1	sum	204,000.00	204,000	Allowance only - 150m at each connection
	Drainage Ditch	2449	m	90.00	220,410	1m depth.
	Stone Haulage Road - 3m wide	1312	m	135.00	177,120	500mm thick stone road
	Boundary Fence	1742	m	35.00	60,970	Post & Wire Fence 1.4m high
	Culvert - 32m x 1.8m dia	2	nr	43,000.00	86,000	
	Culvert - 10m x 0.9m dia extend	1	nr	9,000.00	9,000	8,760,480
Utilities						
	Gas Pipe Diversion	1	sum	100,000.00	100,000	Allowance Only
					-	100,000
Level Crossings						
	Recoveries		%		-	
	Bomac crossing deck		m2		-	
	Cattle/trespass guarding		m2		-	
	Crossing barriers		nr		-	
	Warning lights, inc sounders		sum		-	Road Traffic Lights / Wig Wags
	Local control unit		nr		-	
	Telephones		nr		-	
	New REB - building		nr		-	
	REB - interlocking / signalling		nr		-	
	UTX (12m long inc 2nr TC)		nr		-	
	URX (12m long inc 2nr TC)		nr		-	
	minor modifications for clearances		sum		-	minimum shift cost
			sum		-	No barriers, including fencing alts
			sum		-	-
Other						
	others..please state	-	x		-	-

Summary		
Signalling	**1,677,400**	
AV/DC Electrification	**-**	Not Applicable
Permanent Way	**2,417,800**	
Telecoms	**81,000**	
Operational Property	**-**	-
Structures	**6,900,000**	
General Civils	**8,760,480**	
Utilities	**100,000**	
Level Crossings	**-**	
Other	**-**	
Carried to estimate Summary	**19,936,680**	

OPTION SUMMARY

Project Title / Location	**Rosper Rail Loop 1A**		
Option	B90391-EST-COM0001		
Corus Estimate No.	03-Dec-12	**Revision**	P03
Estimate Date		**Costed at**	4Q2012

section	item	quant	unit	rate	total	Comments
Signalling						
Priced on SEU						
	Signalling Equivalent Units		nr		-	inc T&C & design
	Comprising: Xnr signals, Xnr point ents, Xnr Interlocking alts, Xnr TPWS, Xnr IBJ's/TC					
Elemental pricing						exc T&C & design
	Recoveries		%		-	
	Modify route interlocking	1	Sum	100,000.00	100,000	Allowance Only
	VDU / Panel modifications	1	Sum	50,000.00	50,000	Allowance Only
	Signals: 3 Aspect; controlled.	4	nr	49,000.00	196,000	
	Signals: Banner repeater		nr		-	
	Signals: Subsidiary on same post	2	nr	13,000.00	26,000	
	Signals: Route indicator	4	nr	12,000.00	48,000	
	R/A Off Indicator (incl. plunger)		nr		-	
	Switch heating - point end equip	5	nr	7,600.00	38,000	
	Switch heating - control cabinet	4	nr	13,000.00	52,000	
	Switch heating - power supplies	2	nr	11,000.00	22,000	
	Switch heating - transformer	6	nr	2,200.00	13,200	
	Track Circuit	10	nr	13,000.00	130,000	
	Alts to track circuit lengths		nr	4,900.00	-	
	TPWS	6	nr	18,000.00	108,000	
	AWS - magnet		nr		-	
	AWS (bi directional) complete	6	nr	25,000.00	150,000	
	Location Case & Base	16	nr	13,000.00	208,000	Allow 1 per signal & 2 per point end
	Lineside trough; C/1/9	2000	m	76.00	152,000	
	Lineside trough; C/1/43		m		-	
	UTX (2 track inc 2nr TC)	2	nr	17,500.00	35,000	10.5m long
	Cable: Power	3000	m	20.00	60,000	
	Cable : 48c multicore	3000	m	50.00	150,000	
	Sign: Speed signs (reflective)	16	nr	700.00	11,200	3nr per T/O & 4 per X/O
	Telephones: PZT		nr		-	
	Telephones: SPT inc drivers walkway	4	nr	7,000.00	28,000	
	Upgrade to existing power supplies	1	sum	100,000.00	100,000	Allowance Only
	others..please state		x		-	1,677,400
Electrification						
	Not Applicable				-	-
P-way						
Removals	Removal of plain line	200	m	38.00	7,600	
	Removal of S&C units - Crossover	1	nr	10,000.00	10,000	
	Removal of bufferstops		nr		-	
					-	
Slew / lift / lower						
					-	
	Slew n.e. 25mm		m		-	check is not less that min shift
	Slew n.e. 50mm		m		-	check is not less that min shift
	Slew n.e. 100mm	150	m	82.00	12,300	check is not less that min shift
	Slew n.e 200mm		m		-	check is not less that min shift
	Take-up and relay	158	m	310.00	48,980	
	Additional ballast for slews		m3		-	
	Take up & relay S&C		nr		-	
	lift		Sum		-	use elemest sheet
	lower		Sum		-	use elemest sheet
	others..please state		x		-	
New			m		-	
	Plain line (CEN56; 200mm)	160	m	810.00	129,600	On NR infrastructure
	Plain line (CEN56; 200mm)	1894	m	567.00	1,073,898	On 'Greenfield' land
	E/O for Geotech & Sand blanket	2054	m	82.00	168,428	
	Track drainage		m		-	inc catch pits at 25m centres
	S&C turnouts CV9.25	2	nr	240,000.00	480,000	On NR infrastructure. Incl. point motors.
	S&C turnouts DV	1	nr	300,000.00	300,000	On NR infrastructure. Incl. point motors.
	S&C turnouts CV	1	nr	168,000.00	168,000	On 'Greenfield' land. Incl. point motors.
	S&C crossover		nr		-	
	Bufferstop fixed		nr		-	
	Bufferstop sliding		nr		-	
	Saving for re-use of materials		m		-	
	others..please state		x		-	2,398,806
Telecoms						
	CIS screens		sum		-	includes control equipment
	PA speakers		sum		-	includes control equipment
	CCTV cameras		sum		-	includes control equipment
	Cable: Telecoms 30 pair	3000	m	17.00	51,000	
	Cable: Fibre Optic 24 core		m		-	
	Lineside trough; C/1/9		m		-	In Signalling
	UTX (2 track inc 2nr TC)		sum		-	
	Control cabinet		nr		-	

OPTION SUMMARY

Project Title / Location	**Rosper Rail Loop 1A**		
Option	B90391-EST-COM0001		
Corus Estimate No.	03-Dec-12	**Revision**	P03
Estimate Date		**Costed at**	4Q2012

section	item	quant	unit	rate	total	Comments
	Upgrade to concentrators	1	sum	30,000.00	30,000	Allowance Only
					-	81,000
Operational Property						
	Not Applicable					
Bridges						
	Under Bridge - 50m (single span)	1	sum	2,140,000.00	2,140,000	Single track. Incl. piling allowance
	Under Bridge - 6m (single span)	1	sum	570,000.00	570,000	Single track. Incl. piling allowance
					-	
					-	
					-	2,710,000
Civils						
	Site Clearance - General	34190	m2	0.80	27,352	Small bushes and shrubs
	E/O Shrub clearance (20%)	6838	m2	0.83	5,676	standard price based on large area
	E/O Tree clearance (5%)	1710	m2	2.90	4,958	standard price based on large area
	Engineered Embankment	404	m	15,500.00	6,262,000	8.3m High
	Engineered Embankment	60	m	11,500.00	690,000	7.0m High
	Engineered Embankment	270	m	8,900.00	2,403,000	6.0m High
	Engineered Embankment	180	m	6,500.00	1,170,000	5.0m High
	Engineered Embankment	76	m	3,750.00	285,000	3.5m High
	Engineered Embankment	453	m	2,275.00	1,030,575	2.5m High
	Engineered Embankment	80	m	1,675.00	134,000	2.0m High
	Engineered Embankment	306	m	720.00	220,320	1.0m High
	Stone Columns	5301	nr	600.00	3,180,600	450dia x average 5m deep
	Existing embankments - Geotech work	1	sum	306,000.00	306,000	Allowance only - 150m at each connection
	Drainage Ditch	2449	m	90.00	220,410	1m depth.
	Stone Haulage Road - 3m wide	1312	m	135.00	177,120	500mm thick stone road
	Boundary Fence	1742	m	35.00	60,970	Post & Wire Fence 1.4m high
	Culvert - 32m x 1.8m dia	2	nr	43,000.00	86,000	
	Culvert - 10m x 0.9m dia extend	1	nr	9,000.00	9,000	16,272,980
Utilities						
	Gas Pipe Diversion	1	sum	100,000.00	100,000	Allowance Only
					-	100,000
Level Crossings						
	Recoveries		%		-	
	Bomac crossing deck		m2		-	
	Cattle/trespass guarding		m2		-	
	Crossing barriers		nr		-	
	Warning lights, inc sounders		sum		-	Road Traffic Lights / Wig Wags
	Local control unit		nr		-	
	Telephones		nr		-	
	New REB - building		nr		-	
	REB - interlocking / signalling		nr		-	
	UTX (12m long inc 2nr TC)		nr		-	
	URX (12m long inc 2nr TC)		nr		-	
	minor modifications for clearances		sum		-	minimum shift cost
			sum		-	
			sum		-	-
Other						
	others..please state	-	x		-	-

Summary			
	Signalling	**1,677,400**	
	AV/DC Electrification	**-**	Not Applicable
	Permanent Way	**2,398,806**	
	Telecoms	**81,000**	
	Operational Property	**-**	-
	Structures	**2,710,000**	
	General Civils	**16,272,980**	
	Utilities	**100,000**	
	Level Crossings	**-**	
	Other	**-**	
	Carried to estimate Summary	**23,240,186**	

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