

CRL/4/2

Transport and Works Act 1992

**Transport and Works
(Inquiries Procedure) Rules 2004**

**CROXLEY RAIL LINK
ORDER**

Martin Morris

**Principal Permanent Way Engineer, Sinclair Knight
Merz (Europe) Ltd.**

Proof of Evidence

ENGINEERING

11 September 2012

1 INTRODUCTION

- 1.1 My name is Martin Morris. I am the Principal Permanent Way Engineer working for Sinclair Knight Merz and am involved as a lead designer for the Croxley Rail Link. I am a member of the Permanent Way Institution and hold the status of FPWI.
- 1.2 I have worked in the railway industry for over 40 years, initially in the field of Permanent Way Design and maintenance. I joined British Rail in 1970 as a Junior Technical Officer Permanent Way Maintenance in Manchester. I was promoted to Senior Technical Officer Permanent Way Renewals at Preston.
- 1.3 In 1990 I was appointed Project Engineer in Liverpool and for the next four years was responsible for the delivery of the Permanent Way and Civil Engineering aspects of the Chester Hooton/Ellesmere Port electrification scheme and Liverpool resignalling. Following the privatisation of the railways I undertook the dual roles of Design Manager and Planning Manager for Northern Track Renewals Company (a part of British rail set up as part of the privatisation process).
- 1.4 In early 1997 I left Northern Track Renewals to undertake design review works for Railtrack before joining a firm of Consultants in late 1997.
- 1.5 Since 1997 to date I have worked for several Consultancy firms all within the rail industry being involved in feasibility studies, outline designs and detailed designs for schemes of all sizes.
- 1.6 **Current Role and Responsibilities**
- 1.6.1 Currently I am the Principal Permanent Way Engineer for Sinclair Knight Merz leading the design team on numerous rail projects. I am also responsible for assisting the Rail Assurance manager to ensure that our works are delivered in a manner expected by our clients.

1.6.2 A further role that I undertake is to advise the other disciplines in matters relating to rail giving the benefit of my experience to inter disciplinary matters.

2 SCOPE OF EVIDENCE

2.1 My evidence will cover engineering and construction of the Croxley Rail Link. I will cover all the issues raised in the Secretary of State's Statement of Matters.

3 DETAILS OF SCHEME DESIGN

3.1 Introduction

3.1.1 The proposed scheme involves the extension of LUL's Metropolitan Line to Watford Junction station via the disused Croxley Green Branch Line, currently owned by Network Rail and the existing operational Network Rail line between Watford High Street and Watford Junction stations. It is intended that the section of the existing Metropolitan Line running north from the proposed point of diversion onto the branch line and the existing terminus at Watford Metropolitan Station will be closed to passenger services, but will continue to be used by LUL for stabling of trains.

3.1.2 The scheme has been designed in accordance with LUL's design and engineering standards between the junctions with the existing Metropolitan Line and the existing operational Network Rail line. The works required along the existing operational Network Rail "DC Lines" will largely be designed to Network Rail standards, with due consideration given for the interface required with the LUL systems on the Metropolitan Line and the safe operation of LUL rolling stock.

3.1.3 The total length of the new link, from the junction with the existing Metropolitan Line to the terminus at Watford Junction station will be around 4.8 km.

- The minimum radius of the railway allowable to comply with LUL Standards and to maintain an acceptable operational speed for trains;
- The need to tie in with the existing Metropolitan Line and the Croxley Green branch line within these existing rail corridors;
- The need to locate foundations at appropriate locations along the viaduct taking account of the existing highway layout, the canal and the River Gade;
- The need to achieve minimum clearances over the A412 Rickmansworth / Watford Road; and
- The desire to minimise the effect on existing buildings, to such an extent that no existing buildings will need to be demolished.

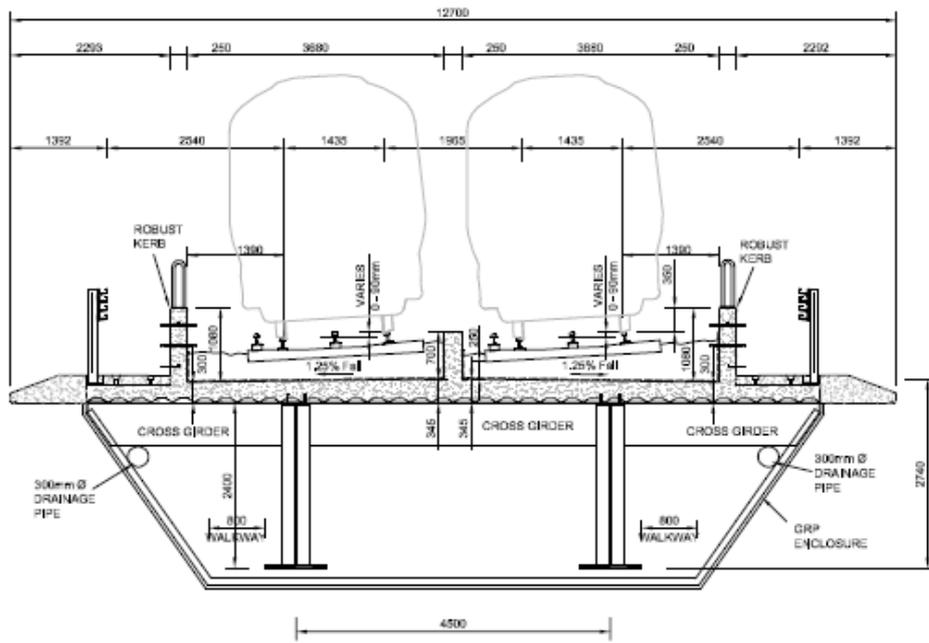
3.2.4 The detailed design of the viaduct has yet to be prepared. Nevertheless, a considerable amount of work has been undertaken already to minimise any adverse impact on the local townscape. The proposed nine-span design comprises a continuous structure with a steel/concrete composite deck and steel/concrete composite cantilevers. It is a form which provides for simple, conventional and safe construction. It also provides a relatively shallow construction depth which serves to reduce the bulk of the structure and allows the maintenance of the required highway clearances over the A412. It enables the width of the piers to be kept to a minimum such that they can take the form of an elongated ellipse which will serve to reduce their bulk when viewed in elevation.

3.2.5 The introduction of an enclosure encasing the steel beams that make up the spans to the structure will ensure what would otherwise appear as a series of straight sections comprising the individual spans appear as a smoothly curved alignment and the jointing arrangement between the straight sections that form the spans can be concealed.

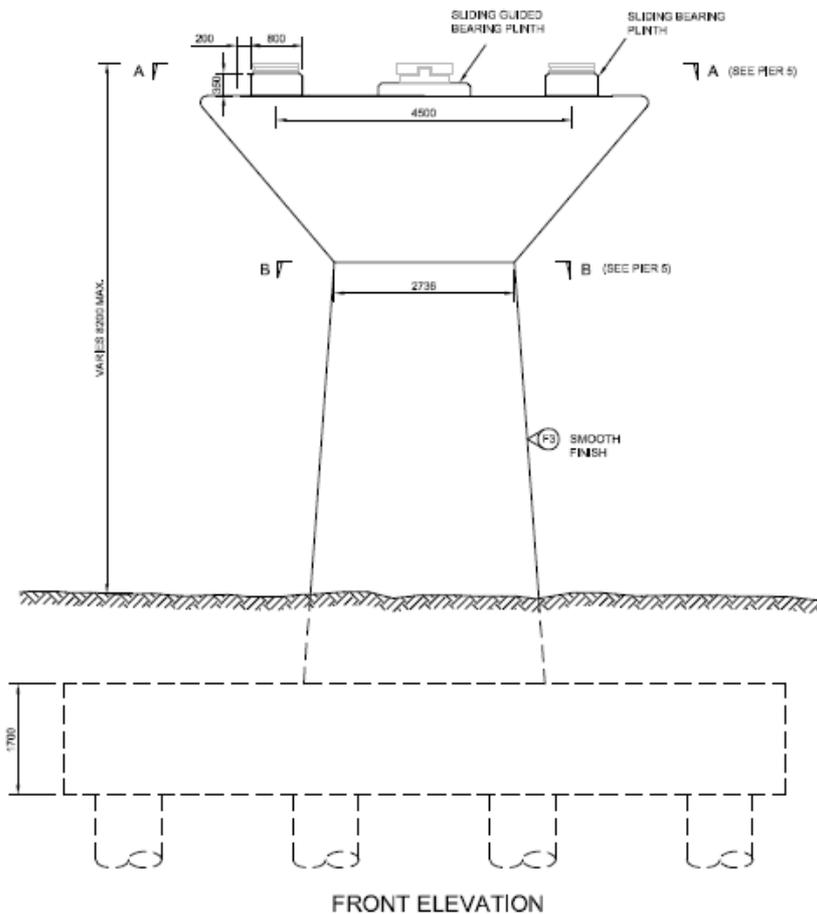
3.2.6 The result is a structure with relatively open spans which will:

- Avoid more significant severance of the local townscape that would result from the introduction of a short-span structure or the use of earthworks embankments with bridges at the required crossing points;
- Require lesser removal of established tree planting than these two options; and
- Achieve an appropriate balance between appearance and impact, cost and future maintenance;

3.2.7 A proposed planning condition attached to the request for deemed planning permission submitted to the Secretary of State with the Transport and Works Order application also secures that no works for the viaduct can commence until the layout, scale and external appearance has been approved by the local planning authority.



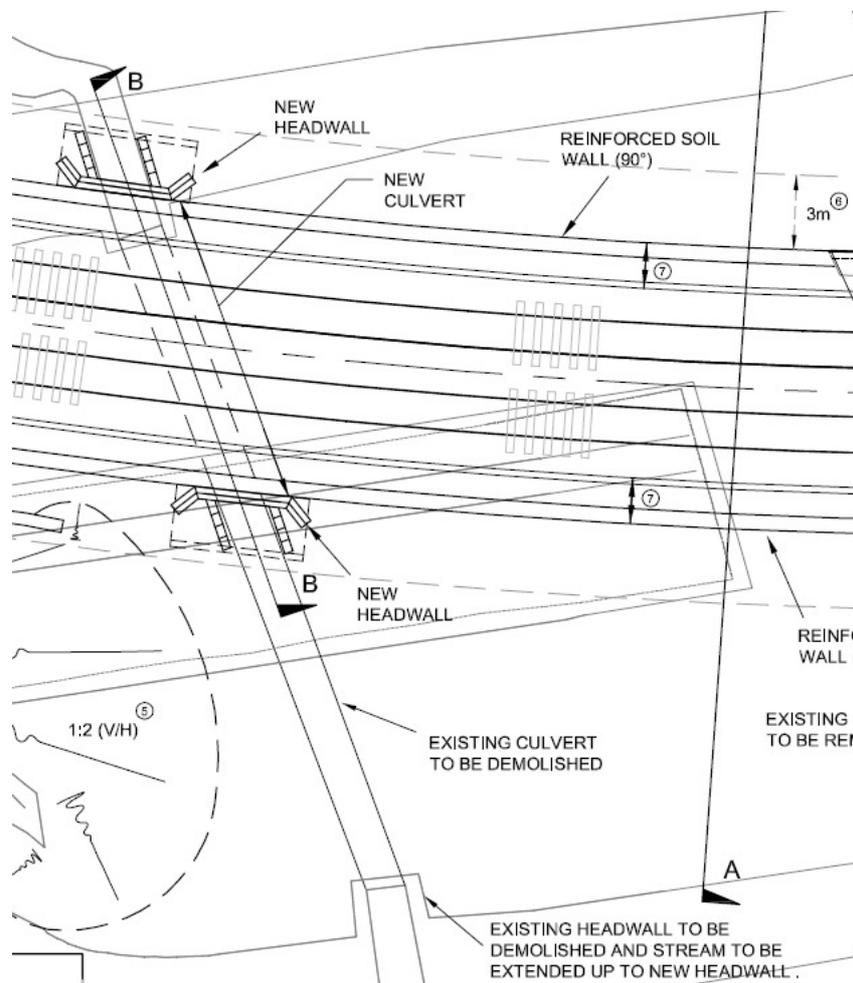
VIADUCT MID-SPAN



FRONT ELEVATION

3.2.8 The eastern end of the viaduct will terminate at the abutment of a reinforced earth wall which will be located between the River Gade and a small watercourse close to and east of the river.

3.2.9 The existing brick culvert that carries the small watercourse beneath the existing embankment to the east of the River Gade will be replaced by a new 1.8m high reinforced concrete culvert built on the line of the existing culvert to enable the course of the watercourse to be maintained. This is Work No 1A.



3.2.10 A new three-span bridge will provide for the crossing of the Ascot Road dual carriageway and the old Ascot Road and this will then tie in with the existing

alignment of the Croxley Green branch line. The existing bridge over the old Ascot Road will be demolished as it is not wide enough to carry the new two-track railway and is not at the correct level. The new bridge will need to be at a higher level than the existing bridge over old Ascot Road in order to achieve the required highway clearance over the two Ascot Roads.

3.3 **Ascot Road Station**

3.3.1 A new station will be located at Ascot Road between the dual carriageway and old Ascot Road and will be integral with the new three-span bridge that crosses the two Ascot Roads. The station will be of steel and concrete construction and sized so as to comply with LUL's engineering and design standards. It will incorporate stairs and lifts to convey passengers from the ticket office at ground level up to the platform level and will thus provide step-free access from the station entrance to the train.

3.3.2 The location of the station is determined, in engineering terms, by the need to have the platforms on a virtually straight length of track to allow step free access from the platform to the train as well as the need for flat platforms on shallow gradients. The station platforms will extend from the station building, over the old Ascot Road and along the back of the embankment east of the road.

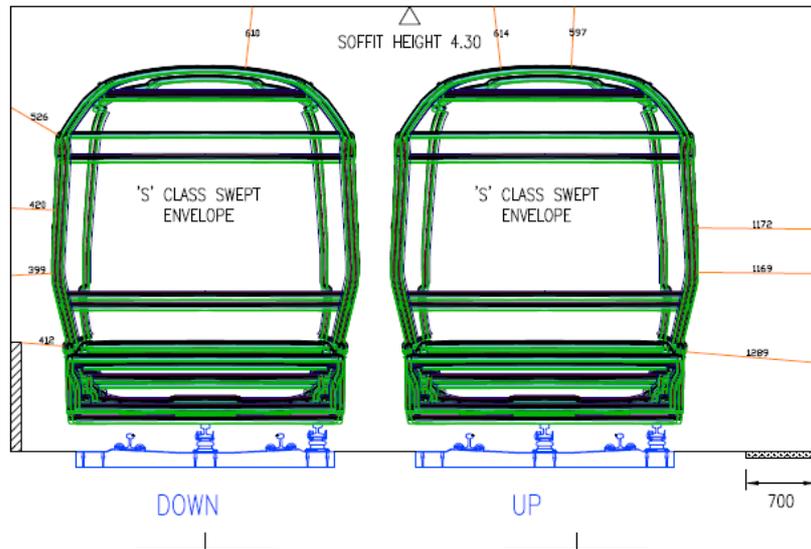
3.3.3 The existing embankment to the east of old Ascot Road bridge will be raised to enable the proposed railway bridges over the two Ascot Roads to be constructed to meet the current clearance standards for road vehicle travelling underneath the railway and also to enable the railway to commence the climb up to the higher level of the Metropolitan Line.

3.3.4 All land required for the station is owned by the scheme promoters and partners.

3.4 **Reinstated Croxley Green Branch Line**

- 3.4.1 The alignment of the reinstated railway follows the existing disused Croxley Green branch line up to Ascot Road where it leaves the existing alignment with the minimum of works specified to ensure conformance with LUL standards. At some locations, lengths of existing cutting slopes will be re-profiled and sheet piling retaining walls will be introduced at the base of the cutting to achieve current design and safety standards adopted by LUL for the slopes and provide for the introduction of the proposed dual track in the bottom of the cutting. All of this will be achieved within the existing Network Rail boundary. East of the proposed Ascot Road Station existing bridges crossing roads and watercourses will be retained, modified and widened to accommodate the dual-track railway and facilitate safe maintenance access to current LUL standards.
- 3.4.2 The railway passes beneath three existing highways bridges that are currently owned by Network Rail. Each of these bridges has been structurally assessed outside of this project as being able to carry full highway loading by the bridge owner and no strengthening work is required, although some repairs to structural defects will be undertaken as part of the project.
- 3.4.3 The span of each of these bridges is sufficient for the reinstated railway to pass below without any need for alteration to the bridge, although it will be necessary to eliminate the maintenance walkway from one side of the railway below the bridge.
- 3.4.4 There a number of underbridges which have been similarly assessed and items of work identified to strengthen, widen or provide footways adjacent have been identified as part of the project.

CROSS SECTION – TOLPITS LANE O/BR.4
AT CHAINAGE 1460m



3.4.5 All of the existing railway infrastructure (track, ballast, signalling, drainage, etc.) will be removed and replaced to enable the provision and operation of the proposed dual-track. All of the existing infrastructure is in very poor condition and does not comply with LUL standards. The platforms at the existing derelict Watford West station and Watford Stadium halt will be demolished and removed to make way for the new railway.

3.4.6 A new electricity sub-station will be constructed adjacent to the disused branch line at Tolpits Lane (adjacent to the derelict Watford West station). A new sub-station is required as the length of railway to be operated by LUL, up to the new junction with the Network Rail line, is longer than the existing line to Watford Met station, requiring reinforcement of the traction power system.

3.4.7 A permanent access route for the purpose of maintenance during operation will be established to the east of the proposed Watford Hospital station, via Cardiff Road, as indicated in Figure 6 below.

3.4.8 Maintenance will involve the occasional running of specialist non passenger trains at any time, though this would normally be during nonoperational hours. These trains may be either diesel or battery powered and could incorporate track maintenance equipment.

3.4.9 All land required for the works is owned by the scheme promoters and partners, apart from a small area of land close to Cardiff road that is owned by Sanctuary Housing Association and is required for the provision of a maintenance walkway along the edge of the bridge over the end of Cardiff Road.

3.5 **Watford Hospital Station**

3.5.1 A new station will be built at Vicarage Road, provisionally named Watford Hospital Station, where an existing bridge currently carries the road over the disused Croxley Green branch.

3.5.2 The station will be of steel and concrete construction and sized so as to comply with LUL's engineering and design standards. It will incorporate stairs and lifts to convey passengers from the ticket office at road level down to the platform level and will thus provide step-free access from the station entrance to the train.

3.5.3 The location of the station is determined, in engineering terms, by the need to have the platforms on a virtually straight length of track to allow step free access from the platform to the train as well as the need for flat platforms on acceptable gradients. It is also influenced by the desire to eliminate the need for any significant works to both Tolpits Lane and Vicarage Road highway bridges which form existing "pinch-points" along this section of line. The station platforms will extend west from Vicarage Road.

3.5.4 All permanent land required for the station is owned by the scheme promoters and partners, with the exception of a small strip of land within the allotment land (but

not used as allotments), owned by Watford Borough Council to the south of the station. This land take has been minimised, but is required so that the station can conform with LUL safety standards. Also a strip of land is required either side of the station to provide a secondary means of escape to meet LUL's fire safety requirement, but these will be limited to "rights of way" and not permanent acquisition.

3.5.5 Watford Hospital station access from the platforms to the street will be at Vicarage Road which is at the Watford Junction end of the platforms. London Underground safety standards driven by the fire officer require an emergency access to be provided at the other end of the station to ensure that staff and public have an adequate alternative method of emergency egress in the event of an incident such as a train on fire blocking the normal exits. The exits will only be used in the event of an emergency by pedestrians egressing the station which is a rare occurrence. The exits proposed are onto Hagden Lane via Holm Oak Park Estate in the eastbound direction and Pioneer Way in the westbound direction. The exit gates will be secured by an electro magnetic lock which will only be released by activation of an emergency alarm and will be covered by CCTV. Currently there are discussions under way with residents re the eastbound direction whilst no objections have been received to date regarding the West bound direction. An alternative route for the eastbound emergency escape was considered, which was to provide a footpath to Tolpits Lane. This route had numerous disadvantages which were: the 175m length of footpath to be provided on the side of an embankment which would be costly due to the engineering works, additional permanent lighting which would increase the light levels into adjacent property, cost of additional lighting, loss of trees on the embankment and the safety issues raised by a number of people detraining and exiting onto Tolpits Lane which carries a significant amount of car traffic.

3.6 **Network Rail “DC Lines”**

3.6.1 East of Wiggshall Road, the new dual-track will merge with the existing dual track Network Rail “DC Lines” at a new junction and from here the railway will be jointly used by LUL and mainline trains (currently operated by LOROL pursuant to a concession agreement let by Rail For London Limited, a TfL subsidiary) to the termination of the proposed scheme at Watford Junction station. A fourth rail traction power system will be installed to allow the LUL trains to run. Other works will involve the upgrade of the signalling system and modifications to the traction power supply system to accommodate the greater number of trains that would use this section.

3.6.2 There are powers within the ‘order’ for platforms to be extended at Watford High Street station and Watford Junction station to cater for the longer LUL trains and some localised modification to the track approaching Watford Junction station will be required to accommodate the platform extensions in this location.

3.6.3 All land required for this element of the scheme is owned by Network Rail.

3.7 **Urban Design Principles**

3.7.1 The design process has sought to reconcile the necessary technical and current design and safety standards adopted by LUL with a number of other potentially conflicting issues. The ES explains the design rationale behind a number of design features. In summary, the design approach across the Croxley Rail Link project has considered the following elements amongst others:

- Operational and functional requirements of the railway
- Environmental effects as well as impacts during construction
- Access for maintenance and inspection
- Materials durability, life span and appearance

- Health and safety
- Passenger accessibility
- Buildability
- Aesthetics and quality of design
- Views and feedback from stakeholders and consultees
- Fit with local context
- Site constraints

3.7.2 Although specific design details and public realm design at the stations will be finalised at the detailed design phase, outline concept designs that apply urban design principles have been progressed concurrently with the design of the stations and land ownership requirements.

3.7.3 Design of the station forecourts will aim to create a clear and legible pedestrian environment, ensure good views, appropriate lighting and height variation for passive surveillance and to minimise opportunities for crime and anti-social behaviour. Enabling ease of movement and natural wayfinding from/ to local facilities, attractors and pedestrian routes is also reflected in the plans. In addition, a clear and consistent signposting strategy will be subject to further development at the detailed design phase. Pedestrian priority principles will aim to reduce conflict between pedestrians and other forms of transport. Materials for the external spaces around the station will be restrained, co-ordinated and simple to maintain.

3.7.4 The public realm design aims to fulfil the principles outlined in TfL's Design and Evaluation Framework for interchange stations set out under the four key themes,

- Efficiency;
- Usability;
- Understanding; and
- Quality

- 3.7.5 The TfL Design and Evaluation Framework is followed to ensure consistency across the LUL Network whilst still conforming to the HCC design and Evaluation process.
- 3.7.6 External spaces will be uncluttered with clearly identified obstacle-free routes connecting well-defined station entrances to the car park at Ascot Road station and other station facilities at both stations. The transition from street to station will be seamless, minimising level changes and avoiding stepped access to accommodate a wide range of access needs. Surface drainage shall be unobtrusive whilst paved surfaces would be safe in wet and icy weather. Watford Hospital station will need to accommodate large event crowds heading for Watford Football Club's Vicarage Road stadium. Space, security, comfort, ease of movement, revenue protection, CCTV, Customer Information Systems and inclusive access will be integrated into the design process at the detailed design stage.
- 3.7.7 As part of the application for the Order HCC and LUL have made a request for deemed outline planning permission for the works to the Secretary of State. The request is accompanied by proposed draft planning conditions which provide for matters such as the height, massing, and external appearances of structures (including the viaduct and stations) to be subject to the approval of the local planning authority as reserved matters.

4 Construction Methodology

4.1 Introduction

- 4.1.1 Subject to the granting of powers in response to the TWAO application, it is anticipated that construction will commence in spring 2014 and that the programme will take some 18 months to complete. Principal construction activities and

timescales based on an indicative high level programme prepared by Vinci, the contractor advisor to the project, are outlined below.

4.1.2 The works will be undertaken in accordance with a project specific Code of Construction Practice to be further developed by the appointed contractor.

4.1.3 The estimated number of vehicles associated with the disposal and import of fill for earthworks has been based on the assumption that all excavated material will be disposed of and all earthworks fill required will be imported. It is, however, likely that a proportion of the excavated material will be suitable for use in fill which will enable a saving in imported fill and a commensurate reduction in vehicle movements associated with disposal and import.

4.1.4 Metropolitan Line Embankment, Viaduct and Reinforced Earth Wall

4.1.5 It is anticipated that the construction of these three components of the proposed scheme will take some 52 weeks. The principal activities which will be undertaken in parallel will comprise:

- construction of the Metropolitan Line embankment - 16 weeks;
- piling for pier foundations - 10 weeks;
- construction of deck spans - 39 weeks; and
- construction of the reinforced earth wall - 8 weeks.

4.1.6 Piles will be bored in the location of each pier to allow for removal of material being extracted in sections, maintaining the integrity of the chalk and reducing the potential risk of contamination associated with the creation of a pathway to the chalk aquifer that constitutes the solid geology in the area. Once material from the initial bore has been abstracted, the borehole will be lined to prevent encroachment of contaminated material that may otherwise be deposited into the borehole as it is deepened.

4.1.7 The main steel girders for the spans will be transported to site in maximum lengths of 27m, the maximum length permitted for transport to site without restriction. The spans will then be bolted and braced on the ground prior to being craned into position onto the pier cap bearings. This will require the use of a lorry mounted telescopic crane. Provision has been made in the TWAO for temporary closure of roads and rights of way which will be spanned by the viaduct during the placement of the fabricated decking sections. It is anticipated that such closures will be no longer than 48 hours in any one location.

4.1.8 Subsequent crane lifting of the secondary steelwork and formwork for the in-situ deck will be performed with a smaller crane and concrete will generally be placed via mobile pump, activities which will not require road closures.

4.2 **Ascot Road Station**

4.2.1 It is anticipated that the construction of the station, including the associated bridges over the Ascot Road dual carriageway and old Ascot Road and the proposed station car park will take approximately 54 weeks.

4.2.2 Construction of the station will require the excavation of the existing remnant section of embankment associated with the disused branch line. Construction will consider the interface with the bridges and it is likely that the main bridge elements will be erected first as these will be larger and heavier. Erection of the station building will be typically by road crane and members will be site bolted. Piling may be required during foundation works.

4.3 **Electricity Sub-Station**

4.3.1 It is estimated that construction of the electricity sub-station will be undertaken over a 30 week period with access to the site from Tolpits Lane, to the south of the proposed dual-track line.

4.3.2 The design of the sub-station is such that excavations will be required in order to place the lower structure of the building below ground level and reduce its overall height.

4.4 **Watford Hospital Station**

4.4.1 The indicative programme makes provision for a 52-week construction period for the station at Vicarage Road, with no more than six weeks required for piling works. Construction of the line and station in this location will involve the deepening of the existing cutting to the west of the Vicarage Road bridge. Construction of the line and station will also involve encroachment into land beyond the disused branch line boundary into an area of scrub which defines the southern limit of an open area of the Harwoods Recreation Ground POS to the north and allotment land to the south. Access for the purposes of construction will be off Vicarage Road to the north of the bridge. Construction traffic would be mainly via a route along the disused railway. Detailed discussions have taken place with the adjacent Laurence Haines primary school to ensure that the movement of construction traffic and construction noise (e.g. piling) will be minimised. Measures being discussed include:

- Prohibition of construction traffic during the morning and afternoon school peak hours, together with minimisation of traffic over the lunch period;
- Prohibition of construction traffic from using the existing Vicarage Road bridge over the disused railway, unless strictly required for access to works on the bridge;
- Prohibition of construction traffic from parking and unloading in Vicarage Road;

- Provision of a banks-person at all times at the Vicarage Road site entrance whose job will be to ensure that all traffic enters and leaves the site in a safe and controlled manner and an increase in number of Banks-persons during the nursery change over period of 11.15 to 12.45;
- Prohibition of piling during exam periods in the first three weeks of May, with an aspiration to undertake piling works during school holidays, if practicable. School holiday periods will be identified within the main Contract;
- Appointment by the contractor of a Liaison Officer to provide liaison between the school and the project.

4.5 Reinforced Earthwork Embankments, Sheet Piling Toe-walls and Gabion Walls and Track Ballast

4.5.1 It is anticipated the earthworks and retaining structures constituting these components of the proposed scheme will take approximately 10 weeks west of Tolpits Lane and 20 weeks east of Tolpits Lane.

4.6 Existing Bridges

4.6.1 The estimated duration of construction works at each of the bridges is shown below.

Bridge Name	Duration of works
Tolpits Lane	4 weeks
Vicarage Road	4 weeks
Cardiff Road	20 weeks
River Colne (north)	17 weeks
River Colne (south)	17 weeks
Wiggenhall Road	5 weeks

4.7 **Platform Extensions and Associated Works**

4.7.1 The duration of the works at Watford Junction and Watford High Street Stations is expected to be in the region of 20 weeks and 10 weeks respectively. Traffic movements for these works are expected to be insignificant in relation to existing HGV movements on the local road network. The impact of the work will be minimal as most of it can be undertaken on weekend possessions. It is envisaged that the works to the track south of Watford Junction station will be undertaken in one 54-hour possession and one 72-hour possession. It is envisaged that the platform works at Watford Junction station will be undertaken in a discrete possession of two platforms with two left operational at all times. The works at Watford High Street would be undertaken simultaneously with that at Watford Junction, as would installation of the new junction to the south of Watford High Street. The conductor rail fourth rail would be installed during overnight possessions, causing no disruption.

4.8 **Drainage**

4.8.1 Individual components of the drainage system will be installed alongside or in advance of the works to be carried out in respect of the other elements of the proposed scheme as described above.

4.9 **Effects of Traffic and Transport**

4.9.1 An assessment has been undertaken of the amount of construction-related traffic which it is anticipated will be likely to use parts of the local road network, based upon works and durations detailed above. The assessment focused on HGV movements associated with the import of essential materials including ballast, ready mixed concrete, reinforcement and steelwork and the disposal off site of material arising from earthworks. This assessment has concluded that the overall

impact on existing traffic flows of delivery of materials is unlikely to be significant. Minor disruption due to the construction works is not expected to have a significant effect on pedestrians, cyclists or users of bus and rail services and the canal. However construction of the viaduct piers/abutments adjacent to the various highways and within the central reservation of the dual carriageway (Watford Road) will require temporary lane closures which will last for a number of weeks dependant on the location. Particular attention will also need to be paid to access and egress for construction and other traffic on the roundabout junction of Watford Road with Baldwins Lane.

4.9.2 Due to the temporary nature of footway, cycleway and highway closures during construction no significant effects in relation to these travel options are expected during construction.

4.9.3 However it is anticipated that the following rail closures will be required during the construction period:

- A 54-hour closure of the existing Metropolitan Line between Moor Park station and Watford Met station to install the new junction;
- A 54-hour weekend closure of the existing Network Rail DC lines between Harrow & Wealdstone and Watford Junction stations to install a new junction with the disused line and to install a 'fourth rail' in the vicinity of the new junction for LUL trains;
- A 72-hour bank-holiday closure of the existing Network Rail DC lines between Harrow & Wealdstone and Watford Junction stations to make changes to the tracks at Watford Junction station and to install a 'fourth rail' in the Watford junction area and in the station platforms; and

- A 54-hour weekend closure of both the section of Metropolitan Line between Croxley and Watford Met station and the Network Rail Line between Harrow & Wealdstone and Watford Junction stations to commission signalling alterations. This will potentially require a short 8-hour possession of the West Coast Main Line when the signalling alterations are commissioned. This closure will be timed to coincide with a Network Rail closure of the West Coast to minimise disruption.

4.9.4 Part of the tender evaluation for the contractor will be their possession strategy and how they strike a balance between disruption to the railway, risk and cost.

4.9.5 A number of smaller possessions will be required for works such as installation of “fourth rail” and cable route and cable installation. It is expected that this work will be undertaken during normal engineering hours / “white periods” to minimise the effect on the travelling public.

4.9.6 Due to the relatively short duration of the works, they are not expected to have a significant effect on current users of the rail network. Additional works to install power cables, ‘fourth rail’ on sections of Network Rail infrastructure not mentioned in the two points above and signalling equipment will be undertaken during several night time closures which should not result in any significant disruption to current services.

4.9.7 There will also be short-term temporary closures of a number of roads in the vicinity of Baldwins Lanes, the A412 Watford / Rickmansworth Road and Ascot Road, together with traffic restriction in the same areas. All traffic restrictions will be carefully managed with the local authorities so as to minimise disruption.

4.10 Site Compounds and Work Sites

- 4.10.1 There will be individual worksites at each pier location, accessed via Baldwins Lane, the roundabout at the junction of Baldwins Lane and Watford Road and from Ascot Road dual carriageway and old Ascot Road. There will be three main sites, with working areas of between approximately 0.1 and 0.3 hectares. A worksite/compound will be established on the proposed site for the station car park. It will be located between the new and old Ascot Roads with access via the A412 and off old Ascot Road. This will be the main compound for the proposed works. A worksite / compound will be established at the site of the new Watford Hospital station with access off Vicarage Road but this will be used for the construction of the station only and not as an access point for the delivery of plant or materials to the rest of the railway. A worksite will also be required at the new sub-station site off Tolpits Lane for the construction of the sub-station.
- 4.10.2 A further worksite and access will also be established from Wiggshall Road through the old Wiggshall Road Good Yard to the south-east of the Croxley Green Branch Line and small worksites will also be established at Watford High Street and Watford Junction stations.

5 SUBSTANTIVE CHANGES TO ORDER

- 5.1 There have been no substantive alterations to the draft Order since the application was made on 6 January 2012.

6 STATUTORY UNDERTAKERS

- 6.1 The effects of the scheme on statutory undertakers and their ability to carry out their undertakings effectively, safely and in compliance with any statutory and contractual obligations.

The Order contains in Schedule 9 protective provisions for various types of or for specific statutory undertakers. The purpose of the provisions is that where there needs to be any relocation of equipment (e.g. pipes, cables, drains, etc.) as a result of the proposed works for the Croyley Rail Link, or where works to protect any structures and equipment such as railway bridges or signals is required, the provisions set out the basis, in each case, for doing so. This ensures that any apparatus or infrastructure belonging to a particular undertaker and its ability to carry out the functions it is required to undertake by law are sufficiently protected when the Croyley Rail Link is constructed and operated. The provisions in the case of Network Rail, Canal & Rivers Trust and LUL also limit the powers under the Order to compulsorily acquire any land used as part of that undertaking. There are also compensation and loss provisions in all cases so that the undertaker is not out of pocket as a result of any works required as a result of the scheme.

7 CONCLUSIONS

7.1 My evidence to the inquiry covers the engineering and construction issues relating to the Croyley Rail Link.

8 WITNESS DECLARATION

8.1 I hereby declare as follows:

- This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed and that the inquiry's attention has been drawn to any matter which would affect the validity of that opinion;
- I believe the facts that I have stated in this proof of evidence are true and that the opinions expressed are correct: and,
- I understand my duty to the inquiry to help it with matters within my expertise and I have complied with that duty.