The Leeds Trolley Vehicle System Order
Environmental Statement - Non-technical Summary
Mott MacDonald Internal Ref. 312694/RPT007
September 2013
Leeds New Generation Transport Environmental Statement

Non-Technical Summary (NTS)

September 2013

Metro and Leeds City Council
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1. Introduction

1.1 West Yorkshire Passenger Transport Executive (Metro) and Leeds City Council have been developing a trolleybus rapid transit scheme for the City of Leeds. This will provide a fast, reliable and environmentally-friendly alternative to car journeys on the most congested corridors into the city. The scheme will be known as Leeds New Generation Transport (NGT). It will comprise a North Line of approximately 10km in length running from Holt Park district centre (north Leeds) via Bodington, West Park, Headingley, the university campuses and through the city centre to Leeds Bridge at the River Aire. The 5km long South Line will continue from Leeds Bridge, through the New Dock area, Hunslet and Belle Isle to Stourton in the south.

1.2 Modern trolleybuses (buses powered by electric motors using overhead wires similar to a tram system, but with rubber tyres like a bus) provide a smooth and comfortable ride due to their advanced suspension systems, electric motors, air conditioning and passenger facilities. They are highly energy efficient with electricity being supplied directly to the vehicle from overhead lines as in tram systems. They have auxiliary batteries and super capacitors to store energy which would be otherwise lost from vehicle braking; this can then be used later to help power the trolleybus.

1.3 A preferred scheme has been determined, provisional funding has been secured and, subject to obtaining the necessary consents, it is anticipated that NGT will be open to passengers during 2020. Implementation of the initial north-south line will help enable the development of other NGT lines to form a network bringing improved accessibility to other parts of the city.

1.4 The Vision Statement for the Leeds NGT scheme is as follows:

*New Generation Transport: creating a modern, reliable and integrated transport system for Leeds and the City Region*

“One of the city’s key transformational projects, the NGT trolleybus system is key to creating an integrated rapid transport network for Leeds to support the city’s future development, transform public transport and offer a real and attractive alternative to travel by car. NGT will be modern, accessible, energy efficient and clean, providing a high quality transport system that offers passengers improved journey times and a frequent, reliable service. It will connect people to key employment sites, education, health and leisure facilities, acting as a catalyst and driver for economic growth and regeneration”.

1.5 In order to accomplish these benefits, the scheme has the following objectives:

- maximise growth of the Leeds economy by enhancing its competitive position and facilitating future employment and population growth;
- support and facilitate the sustainable growth of Leeds, recognising the importance of its city centre to the future economy of the Leeds City Region;
- support and facilitate targeted regeneration initiatives and economic growth in the more deprived areas of Leeds;
- improve the efficiency of the city’s public transport and road networks;
- reduce transport’s emissions of CO₂ and other greenhouse gases;
- promote quality of life through a safe and healthy built and natural environment; and
contribute to enhanced quality of life by improving access for all to jobs and services.

1.6 In order to obtain the necessary powers and consents to construct and operate a trolleybus system, Metro and Leeds City Council are together applying to the Secretary of State for an Order under sections 1, 3 and 5 of the Transport and Works Act (TWA) 1992. This application will be formally known as The Leeds Trolley Vehicle System Order. In connection with the application, a direction is also being sought under section 90(2A) of the Town and Country Planning Act 1990 that planning permission be deemed to be granted.

1.7 As part of this application process, Metro and LCC are required to undertake an Environmental Impact Assessment (EIA) for the works whereby environmental information is collected to identify and assess the potential and significant environmental effects that are likely to arise. The EIA has been undertaken by a team of specialists and the findings are reported in an Environmental Statement (ES) which accompanies the TWA Order Application. The ES informs the decision-making process in relation to the potential beneficial or negative effects of the proposed scheme on the environment. The application process then allows all individuals, groups and organisations that may be directly affected to have an opportunity to express their views.

1.8 This document provides a summary of the main findings of the ES in essentially non-technical language so that anybody with an interest in the scheme can better understand how it will affect them and the local environment. More specifically, it:

- describes the location of the NGT scheme and its purpose;
- provides an overview of the scheme history and alternatives;
- describes the proposed works including a description of the construction process;
- summarises the information required to identify and assess the environmental effects;
- discusses the significant environmental effects that have been identified;
- summarises the proposed measures to avoid or mitigate the significant environmental effects; and
- summarises any significant effects which remain after mitigation measures have been applied.
2. Location and Setting

2.1 The proposed NGT route runs on an approximate north-south alignment through the city. It will commence from a terminus at Holt Park serving the district centre, down to the Bodington Park and Ride site just off the Outer Ring Road. This provides access to various local amenities including University of Leeds sports grounds as well as attracting traffic from the Outer Ring Road. NGT will then proceed southwards past Lawnswood, Weetwood and West Park as well the Leeds Metropolitan University Headingley Campus.

2.2 At Headingley, the route leaves the existing highway on a new corridor to by-pass an area of regular congestion before emerging onto Headingley Lane which will be widened to safely accommodate all road users. After continuing through Woodhouse Moor, a reconfiguration of local area traffic management will facilitate the creation of a pedestrian-dominated street along Woodhouse Lane, better linking the main University of Leeds campus and Leeds Metropolitan University sites to the heart of the city at Millennium Square.

2.3 The NGT route is illustrated in Figure 2.1 and Figure 2.2. Sensitive areas such as conservation areas and ecologically designated sites are also shown on these figures.

2.4 Through the city centre, NGT will provide access to a large number of businesses and facilities the Arena, Civic Quarter, Trinity shopping centre as well as bus and railway interchange at City Square.

2.5 Crossing Leeds Bridge, the route then enters an area of recent development including commercial and retail properties, in particular the New Dock development. From there it proceeds to Hunslet district centre, over the railway to Belle Isle. The route terminates at a park and ride facility at Stourton adjacent to junction 7 of the M621 motorway and Middleton Ring Road.
Figure 2.1: Leeds NGT North Line route (also showing conservation areas affected by the scheme and ecologically designated sites within 2km)

Source: Mott MacDonald, 2013
Figure 2.2: Leeds NGT South Line route (also showing conservation areas affected by the scheme and ecologically designated sites within 2km)

Source: Mott MacDonald, 2013
3. Need for NGT

3.1 Leeds is a growing and prosperous city contributing towards the economic vitality of the wider region. With success comes increased pressure on transport services and transport congestion which constrains future growth and reduces the quality of life for many. Whilst the city has good national and local railway connections the predominant (65.4%) share of commuting trips are by car.

3.2 The Leeds economy is forecast to grow over the next decade. It is therefore important that the city’s transport system supports such growth and helps to stimulate economic activity.

3.3 Leeds does not have a rapid transport system, such as a tram or metro. The city currently suffers from traffic congestion, which is particularly acute during rush hours. There is also presently a shortage of park and ride facilities in Leeds, which again results in a lack of opportunities for car drivers to avoid driving into the city.

3.4 The NGT scheme is supported by the Leeds Chamber of Commerce, Local Enterprise Partnership and many leading businesses who want to grow and develop in Leeds.
4. Benefits of NGT

4.1 Benefits to trolleybus users:
- priority at junctions leading to significantly faster journey times than conventional buses or cars along the route into the city centre – this results in an average NGT journey time from Blenheim to City Square of approximately 20 minutes, compared with 33 minutes for conventional buses in the AM Peak do-minimum scenario;
- 65% of the NGT route is segregated away from general traffic between the Bodington and Stourton Park and Ride sites;
- a modern air conditioned vehicle with passenger information, and excellent ride quality;
- a dedicated control centre to monitor system performance and take action to minimise delays to passengers; and
- providing over 3,000 park and ride car parking spaces, making Leeds City Centre more accessible.

4.2 Environmental and urban realm benefits:
- a highly energy efficient transport system with flexibility to obtain electricity directly from new power generation technology as it emerges;
- no exhaust fumes or pollutants emitted onto city streets improving local air quality and health outcomes especially for children and the elderly;
- a net gain of trees along the route in addition to specific proposals to enhance biodiversity;
- creation of new and upgraded existing public spaces to enhance the local environment and help act as a catalyst for regeneration; and
- creation of new space which will be open to the public on Headingley Hill.

4.3 Pedestrians:
- resurfacing of footways with high quality materials where practicable;
- the transformation of a large section of Woodhouse Lane into a pedestrian dominated street with significantly reduced traffic and widened footways; forming an attractive link between the Universities and the heart of the city centre; and
- a net gain of 56 signal controlled pedestrian crossings reducing walking routes and improving safety.

4.4 Cyclists:
- a total of 16.5km of cycle facilities are provided along the length of the scheme, along with the provision of new Toucan (cycle) crossings;
- widened bus lanes to allow safer overtaking of cyclists by buses;
- priority measures including benefiting from NGT signal phases at some junctions, Advanced Stop Lines, removal of narrowings between traffic islands and safer routes through junctions; and
- new cycle lockers and stands at key locations.

4.5 Bus users:
- priority measures at certain junctions and a net gain of 1km of bus lanes and 10.6km of NGT lanes;
• reduced bus journey times on certain routes and increased service reliability making it more likely your bus will be on time; and
• new bus shelters, stops better located to serve local needs and resurfaced roads leading to better ride quality.

4.6 Car and general road users:
• redesigning of major junctions to improve traffic flow and enhance safety for all road users;
• resurfaced carriageway providing for a more comfortable ride;
• formalised parking and delivery bays on-street to help provide for business and residents’ needs; and
• a park and ride option to access the trolleybus system and by-pass congestion.
5. Consideration of Alternatives

5.1 In a 2009 review of the strategic context for public transport in Leeds, four corridors were identified as being appropriate for major public transport investment. Two of these corridors (the A660 and the A61) are particularly suited to a rapid transit scheme.

5.2 Objectives defining what such a scheme should deliver were established. These objectives were defined to support the wider transport and land-use policy framework for Leeds and West Yorkshire, including the Local Transport Plan covering the period 2011 to 2026. The scheme objectives include improving travel times and punctuality, increasing passenger capacity, improving connections between areas such as Holt Park and Belle Isle and city centre jobs, minimising the effect of transport on the environment, and achieving value-for-money.

5.3 Currently available public transport technology alternatives were considered for the A660 and A61 corridors. Four alternative modes were identified as being suitable given the service/capacity requirements to be delivered and the various characteristics of the corridors:

- Light Rail Transit (LRT or tram);
- Ultra-Light Rapid Transit (ULRT);
- Trolleybus;
- Bus – which could be diesel powered or a diesel hybrid vehicle.

5.4 All of the main technology alternatives could meet the scheme objectives to some degree. However, trolleybuses outperform other possible solutions, both against the scheme objectives and against constraints that have been identified as critical to successfully delivering the project:

- LRT/tram would be considerably more expensive than the trolleybus option. The cost would far exceed the funding available from national or local sources;
- ULRT vehicles would be propelled by on-board power generation (such as diesel engines) and would produce pollutant emissions along the route; and
- diesel and hybrid buses would produce pollutant emissions along the route and offer limited improvement in general ambience or ride quality and would therefore be less attractive as an alternative to car use. The NGT promoters could not specify and guarantee the type of high quality, frequent and reliable service intended needed to secure the objectives for the investment.

5.5 As part of this assessment it was also concluded that the trolleybus gave the greatest environmental benefits for the following reasons:

- lower noise emissions and vibration effects;
- better local air quality as electrical energy won’t generate air emissions;
- lower likely overall carbon emissions and potential for the scheme to be run from renewable energy sources; and
- the most energy efficient vehicle with the possibility of using locally-generated power from waste in conjunction with LCC’s emerging waste policy.

5.6 On balance, the positive noise and local air pollution impact of the trolleybus option in comparison to the best possible bus option would outweigh the visual impact of the overhead wire. The
trolleybus system promoted is therefore the best overall option, taking into account environmental impacts.
6. Proposed Scheme

6.1 A fleet of trolleybuses will operate along the route, serving 27 NGT stops with step free access to the vehicles, shelters and passenger information screens. These stops will be used exclusively by the NGT vehicles.

6.2 Safe and secure car parking will be provided for NGT customers in park and ride sites at Bodington (up to 850 spaces) which is located on A660 Otley Road near the A6120 Leeds Outer Ring Road. A further park and ride site is provided at Stourton adjacent to junction 7 of the M621 and Middleton Ring Road. At Stourton, the parking spaces will be delivered in phases: the first phase will provide circa 1,700 spaces, with the second phase expanding the site to 2,300 spaces.

6.3 The proposed Bodington Park and Ride site will require the removal of six University of Leeds grass sports pitches and these will be replaced by enhanced facilities on the University’s sites at Weetwood, Bodington and Lawnswood. Replacement works include four artificial all-weather pitches along with a new sports pavilion, storage and parking; all of which provide some of the best sporting facilities in the region.

6.4 A trolleybus depot comprising stabling, charging, maintenance facilities, offices and a control room will be provided adjacent to the Stourton Park and Ride site. This facility will be cut into the side of a hill in order to reduce its visual prominence.

6.5 For the length of the scheme, overhead cables, fixtures and fittings (catenary) will need to be installed. These will require either the fixing of bolts and wires to existing buildings, or the installation of poles. These will deliver the electricity for the trolleybus vehicles which will be taken from ten NGT sub stations spread along the route.

6.6 Works to the existing road infrastructure are needed to allow the trolleybus to run; this would include: upgrades to major junctions, new road markings, new traffic signal operations and new signage. Sections of road will also need to be widened to enable new NGT, bus and cycle lanes to be constructed along the route as well.

6.7 Some demolition, predominantly of curtilage (property boundaries) walling, will be required to enable the works. Demolition works have been avoided where possible, and re-instatement of features such as walling will take place where practicable.
7. Construction Phase

Construction Activities

7.1 The construction work will require site compounds and offices at up to 20 sites along the route. Construction activities will normally be restricted to working hours of 08:00 to 19:00 Monday to Friday, and 09:00 to 13:00 on Saturdays. Construction will not normally take place overnight, on Sundays, Bank Holidays, Christmas Day or Good Friday, unless it is necessary to do so for reasons of safety to personnel or to minimise the operating impact on existing infrastructure.

7.2 The demolition of some structures will be required as part of these works, and Conservation Area Consent or Listed Building Consent has been applied for alongside the TWAO where applicable. Listed Building Consent has also been sought where there will be works to attach overhead catenary to listed features.

Construction Management

7.3 A Code of Construction Practice (CoCP) has been developed and will provide strict guidelines for the management of construction activities and ensuring the appropriate mitigation of significant environmental effects during construction. It is appended to the ES and will form part of all construction contracts for the works. In addition to helping to govern construction activities, it also contains provision for a Contractor Liaison Manager to be appointed to help ensure that issues raised during the works are addressed and corrective action taken. During the detailed design stage, a Construction Traffic Management Plan (CTMP) and Construction Environmental Management Plan (CEMP) will be produced, with the appointed contractor.

Construction Programme

7.4 The outline construction strategy assumes that advanced works for constructing the University sports facilities along with removal of invasive species (non-native species with a detrimental impact) could begin in 2015. The main NGT works is proposed to start in 2017, with opening during 2020. An outline construction programme has been prepared with the aim of minimising disruption to nearby residents, businesses and other local stakeholders.

7.5 For each work package, the Contractor will be required to produce a detailed programme. This will include details of production of any working drawings, off-site fabrication, procurement and delivery of plant and materials. An information release schedule will also be requested from the Contractor, together with a detailed method statement and risk assessment.

7.6 The major phases of the work are listed below, with the order of the works depending on site location requirements:

- university sports ground;
- new park and rides;
- new depot;
- demolition works;
- site clearance and any earthworks and retaining structures;
- drainage and kerb works;
ducting for electrical cables;
road markings;
road re-surfacing;
construct sub base and construct carriageway (where required);
ercation of OLE poles and OLE installation;
NGT platforms;
Overhead Line Equipment and communication commissioning; and
electricity sub-station construction.
8. Environmental Impact Assessment

**EIA Scoping and Consultation**

8.1 An EIA Scoping Report was prepared for the proposed scheme and submitted to the Department for Transport in April 2013. The objective of the scoping exercise was to identify which aspects of the proposed scheme are likely to give rise to environmental effects, and to determine the scope of work required for the preparation of the ES. The Department for Transport circulated the Scoping Report to the consultation bodies to seek their views on the scope and method of the EIA.

8.2 The Scoping Opinion provided by the Department for Transport was received in May 2013. It indicated that the consultees were largely satisfied that the topics identified in the EIA Scoping Report and that it met the requirements of the *Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006*.

8.3 Consultation has been undertaken throughout the scheme development process which provided opportunities for stakeholder groups, the general public and local residents to influence and inform the proposals.

8.4 Consultation has included:
- on-going liaison with officers of Leeds City Council;
- public consultation, including exhibitions with flyers and questionnaires;
- meetings with statutory consultees, including the Environment Agency, Natural England and English Heritage; and
- information in the local press.

8.5 The information obtained during the consultation process has been taken into consideration and where possible, reflected within the Environmental Statement.

8.6 Within the Environmental Statement a significant environmental effect is one that, in the opinion of the EIA specialists, ought to be taken into account in the decision-making. An environmental effect may be beneficial or negative, and temporary or permanent. Mitigation measures are actions that are implemented to reduce the significance of an environmental effect. The effect that remains after the implementation of mitigation measures is known as the residual effect.

**Planning Policy Context**

8.7 National, regional and local planning and other policies relevant to the EIA for the scheme were identified. A review was undertaken to assess whether the scheme proposals complied with the relevant planning policies. A Planning Statement has been produced and accompanies the TWAO Application to assess whether the proposed scheme aligns and is compliant with all relevant policies.
Environmental Effects

Air Quality

8.8 The air quality assessment provides a qualitative assessment of the impacts of construction dust and emissions on people within 350 metres of the proposed scheme construction areas.

8.9 In addition it also provides a quantitative assessment of operational air quality effects across Leeds using an advanced dispersion model and based on the transport model created for the scheme.

Construction effects

8.10 Key construction activities have been assessed by considering their dust emission potential and location of sensitive receptors, in accordance with guidance provided by the Buildings Research Establishment and Institute of Air Quality Management.

8.11 Contractors working on site will abide by the proposed scheme’s Code of Construction Practice and Best Practicable Means (BPM). Following the implementation of BPM it has been concluded that there will not be any significant residual effects on air quality.

Operational effects

8.12 During the operational phase all roads which are affected by the proposed scheme have been assessed and the significance of changes in air quality at the most affected sensitive receptors discussed.

8.13 Overall effects on air quality are concluded to be not significant.

Historic Environment

8.14 The historic environment assessment included research of historic environment records, cartographic sources, published and unpublished reports relating to sites within 500m of the centre line of the NGT corridor. There are a total of 323 listed buildings which lie within the route corridor, of which 55 front onto the NGT corridor and may be used for OLE building fixings. NGT passes directly in front of or travels through a total of nine Conservation Areas and runs through or adjacent to two registered parks.

Construction effects

8.15 Construction work associated with the scheme will have an effect on locally important and non-designated archaeological features (due to the potential to remove buried known and unknown archaeological features) as well as listed buildings, Conservation Areas and locally important buildings that make a positive contribution to the conservation areas (due to aesthetic impacts upon setting). These effects, if left unmitigated, would be capable of giving rise to significant impacts on heritage assets.

8.16 The construction of new park and ride facilities, an off-highway route around the back of the Arndale Centre and along Monument Moor, as well as ground works associated with the construction of NGT services and infrastructure may have an negative impact on buried archaeological deposits in particular. This impact can be removed by further mitigation, in the form of archaeology. This is likely to include a combination of:
geophysical Investigation;
archaeological excavation;
archaeological monitoring of ground works in areas expected to contain less significant
archaeological features and deposits;
building recording survey; and
consultation with English Heritage and West Yorkshire Archaeological Advisory Service.

8.17 OLE catenary will be attached by building fixing to the facades of some Grade II, II* and I listed
buildings and buildings in conservation areas. This will cause some visual intrusion within the
conservation areas. A number of buildings along the route have a history of OLE catenary as they
were previously used for OLE when trams previously operated in the city.

8.18 Within Headingley Lane, the widening of the road has an effect on boundary walls associated
with Grade II listed buildings, and non-listed structures at the former Leeds Girls’ High School
site. Prior to mitigation these impacts would have significant negative effects on the listed
properties and on the wider aesthetics of the Headingley Hill and Hyde Park and Woodhouse
Moor Conservation Area. These potential effects will be mitigated by rebuilding boundary walls
close to the current position. Conservation Area Consent will be applied for each application
where applicable, and where necessary building recording surveys may be undertaken.
Post-mitigation, it is considered that the impact will be reduced, although some residual effects
will remain. This is likely to be where the aesthetics are altered by movement of walls and
creation of retaining walls for the NGT off highway alignment. However, post-mitigation it is
considered this is not a significant concern.

8.19 The wider effects of the scheme will affect the visual setting of Conservation Areas as a result of
impacts on trees, land take and the removal of green space and historic boundary walls within the
route corridor. This will be mitigated by re-planting and landscaping and the use of materials
which are of similar style and age to prevent visible joins being seen.

Operational effects

8.20 Impacts upon the Conservation Areas and the setting of listed buildings by the use of overhead
catenary and traction poles as well as the installation of new NGT stops will be mitigated by urban
realm design. These will retain an element of the historic character by using materials which are
sensitive to the appearance of the conservation areas. Landscape enhancements and the
creation of better cyclist and pedestrian facilities within conservation areas will also have the
potential to increase successful interfacing between commuters and the historic elements of the
conservation areas.

8.21 It is considered that following mitigation measures outlined within the assessment, the impact
upon the Historic Environment is largely not significant. Residual effects upon the Conservation
Areas are likely to become not significant after tree planting and urban realm improvements have
matured.

Carbon Effects

8.22 An assessment of the potential change in greenhouse gas emissions of the scheme has been
undertaken which considers potential emissions associated with the construction and operation of
the scheme, changes in the transport network and the carbon efficiency of the scheme.


**Construction effects**

8.23 Construction of the various elements of the scheme may lead to emissions from construction plant, traffic and the use of materials. Averaged over the lifetime of the scheme these are likely to be small. In designing the scheme, a number of design principles have been incorporated in order to reduce the amount of work or materials required, however some carbon emissions are inevitable. The Code of Construction Practice developed for the scheme includes a range of measures to reduce Greenhouse Gas (GHG) emissions. Emissions from materials used in building the scheme are likely to be the most significant source of GHG emissions in the construction phase. The overall impact is likely to be insignificant. Further efforts to reduce the impact will be made as the design progresses.

**Operational effects**

8.24 During the operational phase of the scheme there will be a number of sources of GHG emissions. These include the powering of the trolleybus and other infrastructure and indirect effects on the transport network. The trolleybus system will incorporate regenerative braking technologies to generate and store energy when a trolleybus brakes. The design of the depots and new park and ride buildings has not reached a detailed level, but recommendations have been made in the energy demand assessment that could improve energy efficiency and therefore improve their impact. Emissions from the scheme are likely to be small in comparison with existing emission sources in the area and the effect on the existing transport network is predicted to be neutral. There are therefore no significant residual effects. Leeds NGT offers a highly efficient mode of travel with lower emissions per passenger kilometre than other comparable modes of transport. An Energy Demand Assessment and the Low Carbon Energy Strategy have identified potential opportunities to reduce the impact of the scheme further.

**Community**

8.25 The objective of community assessments is to consider individuals, groups or entities whose access to, and control over, community assets, resources and opportunities may be affected by the project. In terms of NGT, community receptors include local residents, communities and those using community facilities such as schools, post offices and other facilities.

**Construction effects**

8.26 Construction phase mitigation is focussed upon the implementation of a Code of Construction Practice that will impose appropriate requirements on the contractor regarding communication of details of works to be undertaken as well as any disruptions to traffic flows and access provisions for community facilities and local residents.

8.27 The construction phase is likely to deliver temporary negative effects, including: demolition of commercial properties with community value in Hyde Park; land take from three nurseries; temporary disruption to the use of some community resources including open spaces at Belle Isle and Monument Moor (Woodhouse Moor) through construction processes and the use of the space for construction compounds; and minor changes to Public Rights of Way (PRoW).

**Operational effects**

8.28 Operational phase mitigation will include implementation of a detailed communication strategy for the distribution information about the NGT scheme. Improvements will be also made to the open space at Monument Moor.
8.29 The operational phase is likely to deliver some potentially minor negative community effects, including impacts on community resources such as: re-location of the playing fields at Bodington; loss of greenspace at Belle Isle Circus and agricultural land at Stourton; and limited land-take at Monument Moor (Woodhouse Moor).

8.30 However, the NGT scheme will also result in beneficial effects on the community, including improved access to goods and services from improved public transport. Access will also be provided for people in the wider impact area to the city centre, universities and wider community facilities, particularly the education, training, recreation and leisure locations, and new developments along the route. There will also be improvements to aesthetics at Monument Moor (Woodhouse Moor).

Ecology

8.31 The proposed NGT scheme is located through habitats associated with urban areas, largely buildings and hardstanding with amenity grassland and scattered trees. There are parts of the River Aire which lie within the scheme footprint which are highly modified with no aquatic vegetation and there are a number of areas of broadleaved semi-natural woodland along the route with a couple of areas of improved and semi-improved neutral grassland. A series of protected species surveys for bats, breeding birds, otters, badgers and reptiles were undertaken in 2009, 2012 and 2013. Desk study data from West Yorkshire Ecology was also acquired and analysed in 2013.

8.32 Following a review of the data from all surveys, an assessment of the importance of ecological receptors at the site was made. A summary of the results is given below:

- there are four designated sites within 2km of the route, two of which are of national importance and two are of local importance;
- habitats throughout the NGT scheme are at local or less than local importance;
- bats, predominantly of common species, use the route for roosting, foraging and commuting and are of local importance;
- there is potential for breeding birds to be nesting between March and August along the majority of the route which is of local importance;
- should there be Schedule 1 birds nesting, this would be of regional importance;
- otters are known to be present on the River Aire but due to the low impact from the works are of local importance; and
- reptiles are not present on the NGT route and are of less than local importance.

Construction effects

8.33 During construction NGT will have a minor negative effect on ecology. The works will involve the removal of significant areas of habitat including trees and grassland across the scheme, in particular the off highway section behind Headingley.

8.34 By following the Construction Environmental Management Plan (CEMP), the replanting of trees and other habitats, including the designated ecology mitigation area in Headingley, and works being carried out to minimise the effects on protected species the overall construction footprint of NGT will be a minor beneficial impact on ecology which is not significant except for Schedule 1 birds (birds and their young, for which it is an offence to intentionally or recklessly disturb at, on or near an active nest). The scheme will therefore have a minor negative impact on Schedule 1 birds which is a significant residual effect.
Operational effects

8.35 The proposed mitigation will have a minor beneficial effect on bats, breeding birds and habitats by improving potential breeding and foraging areas. Lighting will be planned in such a way as to prevent it affecting any protected species. There will be an increased area of high quality habitat that will provide increased foraging and breeding potential. This may also result in a significant beneficial effect on Schedule 1 nesting birds due to creation of habitat with nesting potential.

Electromagnetic Compatibility

8.36 Electric and magnetic fields are produced wherever electricity is used. The electric field is produced by voltage and the magnetic field by current. EMC is the ability of equipment to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to other equipment in that environment. With all rapid transport systems operated by OLE, there is the possibility of EMC impacting on buildings and facilities.

8.37 A qualitative EMC assessment has been carried out on receptors within a 50m corridor of the Leeds NGT proposed alignment. In addition, a quantitative EMC assessment has been carried out on the University of Leeds during the operational phase.

8.38 A quantitative assessment of the risk from exposures of the general public and workers to electric fields, magnetic fields and electromagnetic fields generated by the proposed scheme has also been carried out.

8.39 The NGT trolleybus system is based on a traction power design for the feeding arrangements that minimises DC magnetic field emissions. This has been confirmed by the EMC assessment undertaken at the University of Leeds which shows that the calculated level of DC magnetic fields emanating from the NGT is far lower than the 400 militesla (mT) limit of exposure recommended for the general public in ICNIRP Guidelines on Limits of Exposure to Static Magnetic Fields.

8.40 Based on the above rationale, electromagnetic field exposure from Leeds NGT is not considered to create a significant risk to members of the public.

Construction effects

8.41 Construction machinery and equipment will comply with the Machinery Directive 2006/42/EC and applicable harmonised standards for EMC. Construction radios will comply with the radio and telecommunications equipment Directive 1999/5/EC and applicable harmonised standards for EMC. When installed and used correctly the risk of this apparatus causing interference is considered low.

8.42 The assessment identified significant residual Electromagnetic Interference (EMI) effects on medical equipment from construction works for the proposed Leeds NGT scheme. However, the two sources of interference identified, construction radios and welding equipment, are not considered to represent a significant risk in practice as both types of equipment will be compliant with applicable EU Directives and harmonised standards.

Operational effects

8.43 The NGT system will be compliant with the fixed installation requirements of the EMC Directive 2004/108/EC.
8.44 Significant negative residual EMI risks have been identified for the following three categories: safety critical medical equipment (e.g. at Leeds Student Medical Practice), sensitive scientific measuring equipment, and Network Rail signalling equipment. This reflects a conservative position at this stage. In practice the DC and LF fields are not considered to represent a significant risk for safety critical medical equipment and Network Rail train protection and detection systems. The results from the EMC assessment at the University of Leeds shows that mitigation will be required for scientific measuring equipment in order minimise the risk of interference to certain items of equipment. The options for mitigation include re-location of sensitive equipment, shielding the equipment or replacement of the equipment with equipment that has higher immunity levels to EMC.

Geology and Soils

8.45 The NGT scheme has the potential to affect the geology and soils along the route and as a result constraints could also be imposed on the construction of the scheme as a result of existing ground conditions.

Construction effects

8.46 Construction works including stripping and replacement of road surfacing, shallow excavation works for foundation construction or road widening, major earthworks proposed at the park and ride sites, construction of retaining walls and ground improvement works required in areas of poor ground conditions or areas affected by shallow mine workings all have the potential to impact on the geology and soils beneath the NGT route.

8.47 Potential effects will be mitigated through the production of Materials Management Plans, Site Waste Management Plans and earthworks strategies, coal mining risk assessments, foundation works risk assessments. Additionally the project will adhere to the Construction Environmental Management Plan and CoCP.

8.48 The assessment predicts that there will be no significant residual effects relating to geology and soils as a result of the proposed NGT scheme.

Operational effects

8.49 Operational effects on geology and soils may occur in the areas impacted by the proposed NGT substations or from contaminated run off at the park and ride sites.

8.50 These operational effects which could potentially cause a risk to the environment will be addressed through the detailed design.

8.51 The assessment predicts that there will be no significant residual effects relating to geology and soils as a result of the proposed NGT scheme.

Landscape, Townscape and Visual Amenity

8.52 This assessment reviews the effects of the proposed infrastructure on the landscape /townscape character and the visual amenity experienced by the users of the areas in the vicinity of NGT.

8.53 The assessment process has sub divided the NGT route into a series of individual character areas to allow a more detailed assessment. The landscape and townscape effects were assessed separately to the visual amenity effects, as they typically can record different impacts and effects.
8.54 The landscape / townscape and visual amenity effects were then assessed for the temporary construction phase as well as on the permanent appearance of the areas along the alignment following completion. The assessment looked at the permanent effects at year 1 and year 15 of operation and how these may be reduced through mitigation.

8.55 It is important to state that this non-technical summary only mentions areas where general effects are found. The full Technical Appendix for Landscape/Townscape and Visual Amenity Impact (see ES Volume II) should be referred to for the full technical and detailed assessment.

Landscape & townscape character

Temporary effects on Landscape/Townscape

8.56 There are a number of temporary significant negative effects during construction on landscape and townscape character. Significant effects are those that have a major or moderate negative effect on the existing landscape townscape character that become evident at the construction phase. Although different for each character area typically these effects are caused where there is substantial increase in the size of highway infrastructure, substantial mature tree loss, demolition of buildings, presence of site compounds or where there is a major change in land use. These significant effects are evident within the following character areas:

- N04 Bodington Park and Ride;
- N05 Otley Road (Bodington Park and Ride to Oxley Hall Road);
- N10 Otley Road (St Chads);
- N11 Otley Road (Weetwood Lane to Shaw Lane);
- N12 Shaw Lane Junction to Alma road;
- N13 Headingley Off Road (Alma Road to Shire Oak Road);
- N14 Headingley Off Road (Shire Oak Road to Headingley Lane);
- N15 Headingley Lane (Richmond Road to Grosvenor Road);
- N16 Hyde Park Corner;
- N19 Woodhouse Lane (Clarendon Road to St Marks Road junction);
- N20 Blenheim Terrace (St Mark’s road to Blackman Lane);
- N22 Woodhouse Lane (Inner Ring road to Portland Crescent);
- N24 Millennium Square;
- N27 City Square;
- S04 Black Bull Street (Crown Point Road Junction);
- S07 Hunslet Road (South Accommodation Road to Joseph Street);
- S08 Whitfield Square & Epworth Place;
- S15 Stourton Park and Ride;
- SP01 University of Leeds Playing Fields Relocation of Pitches to Lawnswood
- SP03 University of Leeds Playing Fields IRB and Lacrosse Pitches within Weetwood.

Permanent effects on Landscape/Townscape

8.57 There are a number of character areas that have significant negative residual effects during the operational phases (year 15) of the scheme, post mitigation. However, there is a reduction on the number of character areas with significant effects from construction to operational phase (year 15). This is reflective of the mitigation measures whereby tree planting and landscape works will have started to mature helping to integrate the scheme into the townscape, and where the new infrastructure, albeit disruptive during construction phase, remains in scale with existing infrastructure and so over time becomes an accepted part of the existing streetscape character. Where there is not the opportunity to provide sufficient mitigation measures, there remains significant negative effects on the landscape/townscape character within the following character areas:
N04 Bodington Park and Ride;
N05 Otley Road (Bodington Park and Ride to Oxley Hall Road);
N10 Otley Road (St Chads);
N12 Shaw Lane junction to Alma Road;
N13 Headingley Off Road (Alma Road to Shire Oak Road);
N14 Headingley Off Road (Shire Oak Road to Headingley Lane);
N15 Headingley Lane (Richmond Road to Grosvenor Road);
N16 Hyde Park Corner; and
S15 Stourton Park and Ride.

8.58 There are some areas where NGT will have slight beneficial effects on the local townscape character, as presented below; however, these should not be compared against the list provided above since they are not similarly categorised as ‘significant’ in terms of the EIA assessment method:

- N01 Holt Park (local neighbourhood centre);
- N02 Otley Old Road (Holt Park to Hospital Lane);
- N03 Otley Old Road (Hospital Lane to Otley Road);
- N17 Woodhouse Lane (Hyde Park);
- N18 Clarendon Road Junction;
- N20 Blenheim Terrace (St. Mark’s Road to Blackman Lane);
- N21 Woodhouse Lane (Blackman Lane to Portland Way)
- N23 Cookridge Street;
- N25 Cookridge Street (Millennium Square to The Headrow);
- N28 Boar Lane;
- S02 Bridge End;
- S03 Waterloo Street and Bowman Lane;
- S04 Black Bull Street (Crown Point Road Junction);
- S05 Chadwick Street (North);
- S06 Chadwick Street (South – Carlisle Road and Saynor Lane);
- S10 Chruch Street; and
- S12 Balm Road (South).

Visual amenity

Temporary effects on visual amenity

8.59 There are a number of temporary significant negative effects during construction on the visual amenity. Significant effects in terms of this assessment are considered to be those that have a major or moderate negative effect on the existing views from adjacent receptors, depending on their sensitivity. As with landscape and townscape character these are effects that become evident at the construction phase and although different for each character area, typically these effects are caused where people’s views and visual amenity is changed because there is substantial increase in the size of highway infrastructure, substantial mature tree loss, demolition of buildings, presence of site compounds, or where there is a major change in land use. These significant effects are evident within the following character areas:

- N01 Holt Park;
- N04 Bodington Park and Ride;
- N05 Otley Road (Bodington Park and Ride to Oxley Hall Road);
- N10 Otley Road (St Chads);
- N12 Shaw Lane junction to Alma Road;
- N13 Headingley Off Road (Weetwood Lane – Shaw Lane.);
N14 Headingley Off Road (Shire Oak Road to Headingley Lane);
N15 Headingley Lane (Richmond Road to Grosvenor Road);
N16 Hyde Park Corner;
N19 Woodhouse Lane (Clarendon Road to St Marks Road junction);
N22 Woodhouse Lane (Inner Ring road to Portland Crescent);
N24 Millennium Square;
S03 Waterloo Street & Bowman Lane;
S04 Black Bull St Street (Crown Point Road Junction);
S07 Hunslet Road (South Accommodation road to Joseph Street);
S08 Whitfield Square & Epworth Place;
S09 Church Street Plaza;
S12 Balm Road (South);
S15 Stourton Park and Ride.
SP01 University of Leeds Playing Fields Relocation of Pitches to Lawnswood; and
SP03 University of Leeds Playing Fields and Lacrosse Pitches within Weetwood.

Permanent effects on visual amenity

8.60 There are a number of permanent significant (i.e. moderate or major) negative effects on visual
amenity that are evident during the operational phases (year 15) of the scheme, after mitigation
has been taken into account. There is a reduction on the number of areas with significant effects
from construction to Operational phase (year 15). This again is reflective of the mitigation
measures whereby tree planting and landscape works will have started to mature helping to
screen key/sensitive views of the proposed infrastructure, and where the new infrastructure, albeit
disruptive during construction phase, remains in scale with existing infrastructure and so over
time becomes an accepted part of the existing view. Where there is not the opportunity to provide
sufficient mitigation measures, there remains significant negative residual effects on
people’s views and visual amenity within the following character areas:

N05 Otley Road (Bodington Park and Ride to Oxley Hall Road);
N10 Otley Road (St Chads);
N12 Shaw Lane junction to Alma Road;
N13 Headingley Off Road (Alma Road to Shire Oak Road);
N14 Headingley Off Road (Shire Oak Road to Headingley Lane);
N16 Hyde Park Corner;
SP01 University of Leeds Playing Fields Relocation of Sports Pitches to Lawnswood; and
SP03 University of Leeds Playing Fields and Lacrosse Pitches within Weetwood.

8.61 There are a number of character areas where NGT will have slight residual beneficial effects on
the local visual amenity; however, these should not be compared against the list provided above
since they are not similarly categorised as ‘significant’ in terms of the EIA assessment method:

N01 Holt Park (local neighbourhood centre);
N03 Otley Old Road Hospital Lane to Otley Road);
N17 Woodhouse Lane (Hyde Park);
N18 Clarendon Road Junction;
N23 Cookridge Street;
N25 Cookridge Street (Millennium Square to The Headrow);
S04 Black Bull Street (Crown Point Road Junction);
S05 Chadwick Street (North);
S06 Chadwick Street (South – Carlisle Road and Saynor Lane);
S07 Hunslet Road (South Accommodation Road to Joseph Street);
S09 Church Street Plaza; and
S10 Church Street.
Noise and Vibration

8.62 Some parts of the NGT alignment pass through areas where there is currently no significant transport infrastructure. Where NGT uses the existing road network construction activities will occur near to residences and other sensitive receptors such as schools and hospitals. Consequently, the NGT service has the potential to give rise to both temporary and permanent noise and vibration impacts in the community. Indirect impacts may also arise as a result of the scheme due to factors such as: people changing from other modes of transport to NGT and from changes in traffic movements on local public highways. The potential noise and vibration impacts and effects have been identified and assessed so that any requirements for mitigation can be identified and appropriate measures can be considered and incorporated within the scheme design.

Construction effects

8.63 Construction of NGT will involve a variety of construction activities along the route ranging from modifications to existing carriageways and erection of overhead line equipment to the construction of new carriageways and park-and-ride facilities and depot. These activities have the potential to generate noise and vibration which will vary over the construction period. It is anticipated that the majority of work will be carried out during normal day-time working periods although there may be the need to work extended hours for reasons of safety or in order to minimise disruption of the transport network.

8.64 Noise and vibration due to construction activities will vary in level and duration depending upon the nature of the works in progress. The assessment of noise effects on receptors such as residences, schools and other sensitive building close to the route has compared predicted noise levels from likely plant with measured baseline noise levels measured prior to the works taking place to determine how significant any increase in noise levels is likely to be. The assessment is used to identify activities most likely to cause disturbance and whether measures to reduce the noise impact from certain construction activities, for example the installation of temporary noise barriers, will be appropriate. No post-mitigation significant effects are anticipated as a result of construction activities, primarily due to the transient nature of any individual phase of construction works.

Operational effects

8.65 The NGT trolleybus vehicle is powered by electric motors using overhead wires similar to a tram system. However, trolleybus vehicles have rubber tyres like a bus which makes them quieter than tram vehicles. Consequently, where electric trolleybus systems have been adopted they have proved to be a quiet mode of transport.

8.66 Changes to the road network around Leeds that are necessary to accommodate the NGT system will also change the noise climate, mainly due to changes in road traffic, the introduction of the park-and-ride, depot and ten electrical substations along the route. Furthermore, the park and ride at Bodington will displace university sports facilities to nearby sites at Lawnswood and Weetwood. These will be developed as all-weather pitches which will change sports activities and the noise climate in these areas. This has been assessed within the EIA. Furthermore, the movement of NGT vehicles on new sections of carriageway in Headingley and Hunslet will introduce a new source of traffic noise. However, as the levels of noise emitted by trolleybus vehicles are relatively low and the service is intermittent this is expected to have a much lower impact than a new section of public highway. Moderate or large negative effects are expected for 280 dwellings and three other receptors. Significant effects due to the passage of NGT vehicles
on segregated sections are expected at the closest receptors to the route. This will be mitigated using a low barrier where practical to do so.

Open Space

8.67 The line of NGT will run past twelve areas of protected (as designated by UDP Policy N1) open space and four sports pitches. NGT will require land at four areas of protected open space and six playing fields for off road running, park and ride facilities and supporting equipment.

Designated open space is considered to be a medium or high sensitivity receptor because of its importance to Leeds.

Construction effects

8.68 The construction phase will have the potential to limit access to open space through earthworks and diversions limiting access and temporary construction compounds and material stores being sited on open space.

8.69 Potential effects will be mitigated through the adoption of construction best practice and the careful siting of compounds so as to reduce the temporary use of open space.

8.70 The assessment predicts that there will be a significant adverse residual effect relating to the use of the open space on Monument Moor as a construction compound during the proposed NGT construction works.

Operational effects

8.71 NGT will require some land from seven protected areas of open space and six playing fields (identified as open space in policy N1 of the UDP) as part of the completed scheme. This land is needed for off road running, park and ride facilities and supporting equipment. These include:

- Tinshill recreational ground;
- Otley Road / Raynel Drive open space;
- Cinder Moor (Woodhouse Moor);
- Monument Moor (Woodhouse Moor);
- Little Moor (Woodhouse Moor);
- Nursery Mount Road / M621 open space; and
- Belle Isle Circus.

8.72 Potential effects will be mitigated through the provision of extra, upgraded playing fields and sports pitches and improvements to areas of open space through enhanced landscaping. An additional area of approximately 3,500 m$^2$ in size will also be provided in Headingley as replacement open space.

8.73 As a result of the NGT scheme, there will be a permanent reduction in the current area of open space by 6,097 m$^2$. This is classed as a significant adverse effect.

Socio-economic

8.74 The objective of socio-economic assessments is to consider individuals, groups or entities whose access to, and control over, socio-economic assets, resources and opportunities may be affected by the project. In terms of NGT, socio-economic receptors are considered to be people and businesses within the study area.
Construction effects

8.75 The construction phase is likely to deliver some significant beneficial residual effects, particularly in terms of direct employment through construction, and indirect economic activity for businesses that would benefit from increased trade due to the workers on site. There may be some temporary disruption to businesses as a result of the construction works, but these are unlikely to be significant.

8.76 Construction phase mitigations are focussed upon the development of a Code of Construction practice that will impose appropriate requirements on the contractor regarding communication of details of works to be undertaken as well as disruptions to traffic flows, and access for businesses.

Operational effects

8.77 The operation phase is also likely to deliver some significant residual beneficial effects rather than negative effects. These include direct and indirect employment effects (generating around 250 and 4,000 jobs respectively) and wider economic uplift (including an annual uplift in GDP of around 2.9%). The scheme will also improve accessibility of key employment sites and new housing sites for people living or wishing to live in Leeds.

8.78 Operational phase mitigations will include a detailed communication strategy focussed on multiple lines of communications for the distribution and dissemination of information about the NGT scheme. However, the majority of significant operational socio-economic effects are positive and as such no specific mitigation measures are required.

Traffic and Access

Construction effects

8.79 The following construction activities are anticipated to be undertaken during construction of the scheme, which may result in effects on traffic and access. It should be noted that apart from the two Park and Ride sites and the construction of the off-line carriageway section bypassing the centre of Headingley the majority of the NGT construction works will be typical of regular highway and utility maintenance activities resulting in short term and localised impacts sequenced along the corridor:

8.80 Construction works are likely to impact on the general public on or adjacent to roads, footways and cycleways. This impact will be more severe where room for construction is limited, most notably within the more urban built-up areas along the route.

8.81 Construction activities will lead to impacts upon routing for vehicles, pedestrians, disabled users and cyclists along with minor changes to a limited number of bus stop locations. The construction impacts are deemed to be low in magnitude and temporary, typically lasting less than a month in any single location. It is considered that the effects resulting from the construction phase would be reduced where possible through mitigation with diversions, temporary access routes and adoption of the CoCP.

8.82 It is considered that the majority of construction impacts would be classified as not significant following mitigation with no residual effects remaining following the completion of the construction period.
Operational effects

8.83 Vehicular movements will be restricted where operational or safety issues have been identified as a result of the introduction of NGT. The likely implications of the introduction of the NGT scheme on all kerbside activity has been considered and the provision and mitigation for the access requirements for business, retail, residential and other premises and facilities is summarised within the Transport Assessment. A net reduction in parking spaces along the existing route will be offset through the provision park and ride facilities at Bodington and Stourton.

8.84 Where practical and feasible the proposed NGT system maintains existing cycle facilities along the route, and wherever possible enhances or extends the current provision. Provision includes new cycle lanes, Advanced Stop Lines (ASL) at signalised junctions where appropriate.

8.85 NGT will provide improved public transport journey times and improve accessibility for non-motorised users. Further details regarding the impact of NGT on highways users will be added following the next draft of the Transport Assessment.

8.86 There will be significant residual effects resulting from the operational phase of the NGT scheme. The majority of these will be permanent and beneficial in nature, and include the following:

- the proposed NGT scheme will improve public transport accessibility to Leeds city centre along the route corridor and provide shorter journey times and greater connectivity for public transport users;
- the proposed NGT scheme will also improve cycling facilities where possible and provide an overall increase in the length of cycle lane provision along the route corridor;
- the operation of NGT will provide greater pedestrian connectivity and improved safety with the widening of footways and the introduction of new controlled crossings along the length of the route alignment at key junctions;
- safety will be improved for all users through the redesign of a number of key junctions which have an accident history along the NGT alignment;
- the introduction of the proposed NGT scheme will affect existing servicing and loading arrangements along the length of the route alignment. This impact will be minimised through replacement of kerbside servicing provision and loading bays where provision has been removed and alterations to servicing arrangements; and
- increased use of side roads to access main routes as a result of roads being stopped up to accommodate the proposed NGT scheme.

Waste Management

8.87 The scheme will generate materials during construction and operations, some of which will be identified as wastes. To manage the wastes generated during construction a Site Waste Management Plan (SWMP) will be developed and will adhere to relevant waste management policies and legislation including the Duty of Care. Operational wastes will be produced by the users of the scheme and this waste will have the potential to be collected and recycled. In addition, some maintenance waste produced through the operation of the scheme may be hazardous in nature and should be stored, handled and managed correctly in accordance with the relevant legislation. Other maintenance waste should be segregated where possible to enable appropriate storage and treatment and encourage recycling.
Construction effects

8.88 There are opportunities to reuse or recycle as much of the waste produced during all phases of the scheme. Waste produced during the construction phases can be reused or recycled on site within the scheme; or off site at appropriate, local facilities with the necessary permits.

8.89 Significant volumes of material will be generated during construction, including spoil from excavation works and off-cuts of construction materials such as concrete, bricks, metal and packaging waste. Every opportunity will be made to segregate and reuse, on site, the materials generated during construction. It is anticipated that the majority of the waste material will be re-used back on site to re-grade or as infill and landscaping where appropriate. This will minimise the need to remove the waste off site. Topsoil will be removed and stored, where appropriate, in order that it can be reused, in particular on the sports pitches prior to reseeding and landscaping prior to reseeding.

8.90 The remaining materials that cannot be used on site will be sent off-site to appropriately permitted or exempt waste facilities for processing and further treatment, or for disposal. The SWMP will be developed and maintained to ensure that waste management procedures and legislation are implemented and complied with and environmental risks are minimised. Similarly a Materials Management Plan (MMP) will be produced, if considered necessary, to demonstrate whether the material produced from the construction phase is waste or not and that the materials are treated and used as set out in the MMP.

8.91 Overall, if the majority of the excavated and construction waste that can be, is appropriately reused on-site or recycled off-site and following the implementation of the SWMP and measures to reuse/recycle the waste, the residual effects from construction that remain post-mitigation on landfill and waste facilities will be negligible, and therefore considered not significant.

Operational effects

8.92 Operational waste produced by the users of the scheme can be recycled, with careful planning, provision of suitable receptacles and design considerations. Operational wastes produced through maintenance and the use of the NGT depot can also be recycled and this waste must, where practicable, be source segregated and recycled off site. Some of this waste will be hazardous such as oils, batteries and fluorescent tubes etc. and these must be kept separate from non-hazardous waste.

8.93 If provision is made to recycle as much of the waste generated through the operations of the NGT scheme as possible, it is considered there will be no significant residual effects relating to waste management as a result.

Water Resources

8.94 The assessment of water resources considers the potential effects on surface water and groundwater in terms of changes in flows, changes in water quality, changes in groundwater levels and flood risk relating to the proposed scheme. A separate flood risk assessment was also prepared to provide detail on the flood risk aspects of the proposed scheme.

Construction effects

8.95 The proposed scheme could affect the River Aire and its tributaries and is located over an aquifer that supports groundwater supplies at a local scale. Surface watercourses and groundwater could be affected through the runoff of contaminants or the spillage of contaminating substances.
These potential effects will be managed by ensuring that construction is planned to manage and minimise these risks. Water may need to be sourced from local supplies for construction purposes. This will need to be managed carefully to ensure that other water users or the water environment are affected. On this basis, there should be no significant effects on the water environment during the construction phase.

Operational effects

8.96 Surface water and groundwater quality could change as traffic patterns alter following scheme operation. This could lead to an overall improvement in water quality. The construction of areas of new hardstanding and drainage of new sports facilities could change the flow in rivers and groundwater levels at a local scale. This will be managed by adopting best practices techniques, including the use of sustainable drainage systems. Following implementation of the proposed mitigation the operational impact of the scheme is not considered to be significant.
9. Conclusions

9.1 The operation of NGT will bring benefits to the surrounding areas, as commuters and other travellers will be able to access the city centre and areas along the route more quickly and conveniently. It is considered that NGT would be environmentally acceptable overall, as is indicated by the results of the EIA process. This is due to well considered construction methods, the incorporated environmental mitigation measures and the proposed urban design of NGT, all of which reduce the overall environmental effects of the scheme. In addition, the NGT scheme is anticipated to bring wider benefits, boosting the local economy by reducing the amount of time it takes people to travel to work and other destinations and by increasing the number of people that can access the city centre within a 30 minute commute.

9.2 The development of NGT will inevitably result in some changes to the existing environment and this will result in some significant effects, most of which occur as a result of the construction works. These will be minimised as far as reasonably practicable through adherence by the appointed Construction Contractor to the standards and procedures set out in the Code of Construction Practice, Construction Environmental Management Plan and the Construction Traffic Management Plan. The Code of Construction Practice has been developed and agreed with Leeds City Council and Metro. This will result in the reduction of many of the environmental effects on site.

9.3 The significant effects during construction are as follows:

<table>
<thead>
<tr>
<th>Significant residual effects: construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
</tr>
<tr>
<td>▪ permanent land take from the Three Bears Nursery and Rose Court Nursery, affecting children and parents; and</td>
</tr>
<tr>
<td>▪ demolition of shops on Headingley Lane, impacting upon use by the community.</td>
</tr>
<tr>
<td>Ecology</td>
</tr>
<tr>
<td>▪ the construction phase of NGT creates a significant residual effect for Schedule 1 breeding birds through habitat creation which will be minor beneficial.</td>
</tr>
<tr>
<td>EMC</td>
</tr>
<tr>
<td>▪ radiated emissions from construction radios and welding equipment will be controlled by type testing to applicable harmonised standards and compliance with EU Directives;</td>
</tr>
<tr>
<td>▪ intentional radio emissions will also be controlled in terms of amplitude and frequency range by compliance with standards;</td>
</tr>
<tr>
<td>▪ critical medical equipment is designed, built and tested to withstand electromagnetic emissions from radio and industrial equipment; and</td>
</tr>
<tr>
<td>▪ the separation distance between the source of interference (i.e. construction radios and welding equipment) and the medical equipment means that the field strength will be attenuated.</td>
</tr>
</tbody>
</table>
### Significant residual effects: construction stage

| Historic Environment | • significant effects associated with the construction of the off highway corridor and the loss of trees within the Conservation Areas of Headingly, Far Headingly, Headingley Hill & Hydep Park & Woodhouse Moor and West Park.Whilst these impacts will be partially mitigated through replanting and landscaping to be incorporated into the townscape and landscape design, this mitigation will not take effect until the planting has matured.  
• the demolition of the unlisted buildings that detract from the character of Headingley Hill & Hyde Park & Woodhouse Moor Conservation Area (Headingley Lane) will result in beneficial significant effects.  
• the loss of buildings (Victoria Road, Wood Lane and Alma Road) that make a positive contribution to Headingley Conservation Area would remain as a significant residual negative effect. However, overall the effect within the Conservation Area is likely to be neutral. |
| Landscape, Townscape and Visual Amenity | • out of twenty-nine character areas on the North Line, fifteen will potentially be subject to significant negative residual effects on landscape/townscape character during the construction phase.  
• out of fifteen character areas on the South Line, five will be subject to significant negative residual effects on landscape/townscape character during the construction process.  
• for the sports pitch character areas, two out of three will experience significant negative residual effects during construction. |
| VISUAL AMENITY IMPACTS | • during construction out of the twenty-nine character areas on the North Line, thirteen areas will potentially contain visual receptors that will be subject to significant negative residual effects to visual amenity.  
• on the south route out of fifteen character areas, nine will potentially have visual receptors which will be subject to significant negative effects to visual amenity.  
• only two groups of sensitive visual receptors, relating to the sports pitches relocation will experience significant negative effects. |
| Open Space | • use of Monument Moor (Woodhouse Moor) as a location for a construction compound. |
| Socio-economics | • the construction phase is likely to deliver mostly significant beneficial residual effects, particularly in terms of direct employment.  
• some minor negative effects are likely to be experienced including disruption to businesses and access during construction activities. However, these residual effects are not considered to be significant due to the small level of disruption experienced. |
Significant residual effects: construction stage

<table>
<thead>
<tr>
<th>Traffic and Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>construction activities will lead to impacts upon routing for vehicles, pedestrians, disabled users and cyclists. There will also be minor changes to a small number of bus stop locations. The construction impacts are low in magnitude and temporary. It is considered that the effects resulting from the construction phase would be reduced where possible through mitigation with diversions, temporary access routes and adoption of the CoCP.</td>
</tr>
</tbody>
</table>

9.4 The significant effects during operation are as follows:

Significant residual effects: operation stage

<table>
<thead>
<tr>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>significant beneficial effect through improved access to good and services; permanent land take at Belle Isle Circus and Monument Moor, resulting in loss of community open space; and permanent land take at Stourton for the park and ride, resulting in loss of agricultural land.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>the operational phase of NGT creates a significant residual effect for Schedule 1 breeding birds through habitat creation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>significant residual EMI risks have been identified for the following three equipment categories: safety critical medical equipment; sensitive scientific measuring equipment; and Network Rail signalling equipment.</td>
</tr>
<tr>
<td>this reflects a conservative position at this stage. In practice the DC and LF fields are not considered to represent a significant risk. During design and installation an EMC Management Plan and /or Control Plan should be produced to ensure all EMC hazards are addressed fully.</td>
</tr>
<tr>
<td>for scientific measuring equipment the results from that EMC assessment at the University of Leeds shows that mitigation will be required in order minimise the risk of interference to certain items of equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landscape, Townscape and Visual Amenity</th>
</tr>
</thead>
<tbody>
<tr>
<td>during operation and after 15 years, out of the 29 character areas on the North Line, nine areas will potentially be subject to significant negative residual effects on landscape / townscape character.</td>
</tr>
<tr>
<td>although different for each character, typically these residual effects are caused where there is insufficient scope to fully mitigate against substantial increase in the size of highway infrastructure, substantial mature tree loss where replacement planting will not have had time to mature and fully offset the loss, demolition of buildings or where there is a major change in land use</td>
</tr>
<tr>
<td>out of the 15 landscape / townscape character areas on the South Line, no character areas are likely to be subject to significant negative residual effects. One character area will exhibit significant beneficial landscape/ townscape effects.</td>
</tr>
</tbody>
</table>
## Significant residual effects: operation stage

### Visual Amenity Impacts (At Year 15)

- Out of the 29 character areas on the North Line, five will potentially have visual receptors that will be subject to significant negative residual effects to visual amenity.
- Out of the 15 landscape/townscape character areas on the South Line no visual receptors are likely to be subject to significant negative residual effects.
- Only one group of sensitive visual receptors, relating to the sports pitches relocation will experience significant negative effects during operation at year 15 within character area SP03 (University of Leeds Playing Fields IRB and Lacrosse Pitches within Weetwood).

### Noise

- In the short term slight or moderate beneficial effects are predicted for 301 dwellings and 20 other sensitive receptors along the route.
- Moderate or large beneficial effects are predicted for 86 dwellings and one other receptor.
- Beneficial effects are predicted in the vicinity of the University of Leeds on Woodhouse Lane between St Marks Road and Cavendish Road and off-highway areas where traffic flows are predicted to decrease due to NGT, or where existing through routes will be closed off due to the NGT.
- Slight or moderate negative effects are predicted for 1,342 dwellings and 25 other sensitive receptors along the route.
- Moderate or large negative effects are anticipated for some 604 dwellings and 4 other sensitive receptors and large or very large negative effects are predicted for 274 dwellings and 3 other sensitive receptors.
- In the long term, 619 dwellings and seven other receptors are predicted to have slight or moderate negative effects in the long term. 280 dwellings and three other sensitive receptors are predicted to have moderate or large negative effects in the long-term.

### Open Space

- There will be a permanent loss of approximately 6,097m² of designated open space across the route and the creation of approximately 3,500m².
- Provision of new open space is limited to Headingley, although this is the ward with the greatest deficit of open space across the city.
- The loss of designated open space is spread across seven sites and the application of planning policy governing the protection of designated open space means the localized losses are significant at the community level, but not to the City of Leeds as a whole.
- The creation of new open space near to the Headingley Lane stop will provide a significant beneficial effect at the local level due to the current shortfall of open space provision in Headingley ward.

### Socio-economics

- Long-term employment for operation and maintenance of NGT.
- Additional indirect economic benefits and impacts on socio-economic resources.
- Improved access to employment sites.
- Improved access to new housing sites.
Significant residual effects: operation stage

**Traffic and Access**

- There will be significant residual effects resulting from the operational phase of the NGT scheme. The majority of these will be permanent and mostly beneficial in nature:
  - NGT will improve public transport accessibility to Leeds city centre along the route corridor and provide shorter journey times and greater connectivity for public transport users.
  - NGT will improve cycling facilities where possible and provide an overall increase in the length of cycle lane provision along the route corridor.
  - The operation of NGT will provide greater pedestrian connectivity and improved safety with the widening of footways and the introduction of new controlled crossings along the length of the route alignment at key junctions.
  - Safety will be improved for all users through the redesign of a number of key junctions which have an accident history along the NGT alignment.
  - Introduction of NGT will affect existing servicing and loading arrangements along the length of the route. This impact will be minimised through replacement of kerbside servicing provision and loading bays where provision has been removed and also through alterations to servicing arrangements.
  - There will be an increased use of side-roads to access main routes as a result of roads being stopped up to accommodate NGT.

9.6 Where significant negative effects currently remain, efforts will be made through more detailed design and investigation to minimise these effects, so far as is reasonably practicable. Overall, the NGT scheme will bring high frequency, fast and reliable journeys into and across Leeds. NGT will help to create 4,000 permanent new jobs along the route and the scheme is also forecast to generate a £160 million per annum boost for the Leeds City Region economy.
10. What Happens Next?

10.1 The Environmental Statement, of which this non-technical summary forms one component, will be considered by the Secretary of State as part of the TWA Order application. If substantive objections to the application are made then a Public Inquiry is likely to be held. Estimated dates for the programme are as follows:

**Submission of TWAO Application** September 2013

**Public Inquiry** Spring 2013

**Secretary of State’s Decision** Late 2014 to early 2015

**Construction of main works** 2017 to late 2019

**Scheme operational** 2020

10.2 The environmental effects summarised in this document may be raised at Public Inquiry. The Inspector presiding over the Inquiry will then prepare a report advising the Secretary of State on the implications of the scheme, including its environmental effects. Metro and LCC will continue to identify how predicted negative effects identified in the ES might be further reduced through alternative design and construction methods.

10.3 A copy of all of The Leeds Trolley Vehicle System TWA Order application plans and documents submitted may be inspected free of charge from the date of the application submission at the places and times set out below.

10.4 All documentation can be also downloaded from the NGT website www.ngtmetro.com free of charge under the ‘documents’ tab. Some of the files are very large files and may take a little longer to download.

10.5 Paper or electronic copies of the documents may also be obtained from The NGT Team, Metro, 40-50 Wellington Street, Leeds, LS1 2DE (email: ngtinfo@wypte.gov.uk). A charge will be payable if you request a paper copy (subject to availability) a CD of the submission material is available for free upon request.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Address</th>
<th>Opening Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro</td>
<td>Wellington House, 40-50 Wellington Street, Leeds, LS1 2DE</td>
<td>Mon - Fri 09:00 - 16:00</td>
</tr>
<tr>
<td>Leeds City Council Development Enquiry Centre</td>
<td>Leonardo Building, 2 Rossington Street, Leeds, LS2 8HD</td>
<td>Mon, Tue, Thurs 08:30 - 17:00 Wed 10:00 - 17:00 Fri 08:30 - 16:30</td>
</tr>
<tr>
<td>Leeds Central Library</td>
<td>Calverley Street, Leeds, LS1 3AB</td>
<td>Mon - Wed 09:00 - 20:00 Thurs - Fri 09:00 - 17:00 Sat 10:00 - 17:00 Sun 13:00 - 17:00</td>
</tr>
<tr>
<td>Holt Park Community Library</td>
<td>Holtdale Approach, Leeds, LS16 7RX</td>
<td>Mon 10:00 - 20:00 Tues 09:00 - 17:00 Wed 09:00 - 20:00</td>
</tr>
<tr>
<td>Organisation</td>
<td>Address</td>
<td>Opening Hours</td>
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</tr>
<tr>
<td>Headingley Library</td>
<td>North Lane Library, Leeds, LS6 3HG</td>
<td>Mon-Fri 09:00 - 19:00, Sat 10:00 - 14:00, Sun 12:00 - 16:00</td>
</tr>
<tr>
<td>Hunslet Library</td>
<td>Waterloo Road, Leeds, LS10 2NS</td>
<td>Mon 13:00 - 18:00, Tues 10:00 - 18:00, Wed Closed, Thur 10:00 - 18:00, Fri Closed, Sat 10:00 - 15:00, Sun 11:00 - 15:00</td>
</tr>
<tr>
<td>Brotherton Library</td>
<td>The University of Leeds, LS2 9JT</td>
<td>Mon - Thur 09:00 - 17:00, Fri 10:00 - 17:00, Sat 10:00 - 17:00, Sun Closed</td>
</tr>
<tr>
<td>Leeds Metropolitan University City Campus Library</td>
<td>Leslie Silver Building, LS1 3ES</td>
<td>Mon - Fri 08:30 - 17:00</td>
</tr>
<tr>
<td>Leeds Metropolitan University Headingley Campus Library</td>
<td>James Graham Building, LS6 3HF</td>
<td>Mon - Fri 08:30 - 17:00</td>
</tr>
</tbody>
</table>

10.6 Any objections to, or other representations about, the proposals in the TWAO application should be sent to the Secretary of State for Transport either via e-mail to transportandworksact@dft.gsi.gov.uk or in writing to the following address:

*Transport and Works Act Orders Unit, General Counsel’s Office, Department for Transport, Zone 1/18, Great Minster House, 33 Horseferry Road, London, SW1P 4DR*

10.7 An objection or other representation must:

i. be received by the Secretary of State on or before the expiry date for objections (42 days after submission of the application);

ii. be made in writing (whether sent by post or e-mail);

iii. state the grounds of the objection or other representation;

iv. indicate who is making the objection or other representation; and

v. give an address to which correspondence relating to the objection or other representation may be sent. (If you are sending your objection or other representation by e-mail, please provide a postal address).

10.8 The Secretary of State may make complete copies of the objections and other representations public, including any personal information contained in them, and will copy them to the applicant for the order.