

APPENDIX 16A:ENVIRONMENTAL COMMITMENTS AND MITIGATION MEASURES

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Socio Economic and Community	<ul style="list-style-type: none"> ● A local liaison officer will be appointed by the Contractor to ensure that any issues from the local community are dealt with promptly and efficiently during construction. ● A Traffic Management Plan will be formulated and subsequently implemented in advance of construction works being carried out in order to minimise disruption to the general public (see Chapter 13.0) 	<ul style="list-style-type: none"> ● No mitigation measures are required during the operational phase.
Visual / Landscape	<ul style="list-style-type: none"> ● Mitigation during construction will be achieved by the implementation of the necessary Environmental Management Plan (EMP) for the project which will minimise disruption and dust from compounds and assembly areas, and particularly along the track bed. These measures are detailed further in Chapter 10.0. ● Damage to property, to grassland, trees, planting and carriageways will be minimised with necessary protection/ hoarding put in place. Where damage cannot be avoided, it will be repaired or replaced. 	<ul style="list-style-type: none"> ● Primary amelioration of the line will be achieved through the design co-ordination by the respective design teams of the proposed Luas Line A1 alignment with the adjoining carriageways, boundaries and paths, and through careful design of road crossings and stops. ● All elements of the proposed stops will be similar to those on the existing Red Luas Line, with the exception of the Belgard Stop which will have a canopy structure covering the platform. All finishes will be in high quality materials and will incorporate appropriate planting. Planting will be incorporated where possible and appropriate. ● Where possible, mitigation will be achieved by planting trees and shrubs along the corridor in the limited space available within the landtake, and to assist in absorbing the alignment into the future design of new developments. ● During the operational phase the landscape elements, including grassing, trees and shrub planting, will require planned maintenance and replacement, to ensure their health and long term growth.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
<p>Flora & Fauna</p>	<ul style="list-style-type: none"> ● In the event that badgers are found to be present in the sett, exclusion will be carried out under a licence to be applied for from the National Parks and Wildlife Service (NPWS) and in accordance with the National Roads Authority's Guidelines for the Treatment of Badgers prior to the construction of National Road Schemes (2005). ● A dusk and dawn survey will be carried out at each structure to be demolished on the night immediately prior to demolition. Should no bats be found within any of these structures then they will be demolished the day immediately following the survey. ● It is recommended that demolitions do not take place between November and February (or during cold snaps either side of this period) as bats may be hibernating during this period and a pre-demolition survey would not be expected to detect bats if present. If the construction schedule will not allow for this timing, then the NPWS will be consulted and an appropriate strategy for the demolition works will be agreed. ● Any drainage ditches or watercourses which are to be filled in, culverted or re-directed will be examined by an ecologist prior to works commencing. If any protected amphibian species are noted within these they will be re-located under licence from the NPWS to a suitable alternative location. ● It is recommended that where possible hedgerows are not removed or cut between the beginning of March through to the end of September in order to avoid negative impacts on nesting bird species and breeding mammals. 	<ul style="list-style-type: none"> ● No mitigation measures are required during the operational phase.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Archaeology/Architectural & Cultural Heritage	<ul style="list-style-type: none"> ● The RPA Project Archaeologist will ensure that a high quality of archaeological assessment in accordance to best practice takes place during the site preparation and construction stages of the proposed development. The Project Archaeologist will liaise with all necessary statutory authorities. ● RPA has prepared an archaeological code of practice which aims to strengthen management practices in relation to archaeology and contribute to the development of a more consistent approach to archaeological resolution. This code of practice has been released at the time of writing this report; the proposed practices will be incorporated into the Luas Line A1 project at a later date. ● The properties ID1 & ID3 are of local architectural heritage merit and as they are being demolished a photographic survey must be compiled of these two 19th century structures. ● As part of the overall archaeological monitoring of the scheme, it is recommended that the monitoring of the removal of the townland boundaries be carried out and the nature and make up of a representative sample of the boundary be recorded (i.e. with photographs and a written description). 	<ul style="list-style-type: none"> ● No mitigation measures are considered necessary during the operational phase.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Soils	<ul style="list-style-type: none"> ● During construction the potential for contamination associated with wastes will be minimised by the use of best practice guidance published by the Construction Industry Federation ● The contractor will be bound by the terms of the contract to exercise due care and attention in the handling and disposal of any potentially contaminated material in accordance with the Waste management Acts 1996-2003. ● The potential for erosion of soils or subsoils during construction is considered to be low but will be mitigated by controlling traffic movement and diverting of surface water run-off via interceptor drains on portions of the route from which vegetation and top soils have been stripped 	<ul style="list-style-type: none"> ● The potential for leakages due to the application of herbicides will be minimised by the application of best practice techniques in the handling and application of herbicides. Herbicides will not be stored along the railway line route and will only be transported to and from the line by personnel trained in their handling and application ● During the operational phase, the track line will be monitored as part of the maintenance programme for the Luas Route. Any settlement will be identified and addressed as soon as it is detected. ● The potential for erosion will be mitigated by the construction of appropriately graded embankment slopes. ● Surface water drainage systems will be installed where necessary to prevent the risk of ponding of rainwater along the track line. ● There will be a process of reseeded the soil stripped areas to restore grass and other vegetative cover.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Water	<ul style="list-style-type: none"> ● The potential impacts will be mitigated at the construction stage by preparation and implementation of an Environmental Management Plan (EMP) for the project. ● The Contractor will be obliged to ensure the avoidance of silt contaminated surface water runoff by intercepting the runoff with silt traps and settlement ponds/bays as temporary construction measures at outfalls to ditches and watercourses. Regular servicing and cleaning of these traps and bays will ensure there is a low risk of contamination of the watercourses from silt and debris during the Construction phase. ● The planning of the culvert construction will take into account the river levels and predicted flows before starting work. This will ensure that there is no adverse flooding upstream of the construction locations. It will take into account the specification and amount of materials (i.e backfill to culvert surrounds) required for the construction, and will include mitigation measures to ensure that none of the construction materials are inadvertently dumped in the watercourse. ● The Contractor will be obliged to ensure that no deleterious material is deposited in or near any watercourse or open ditch in the course of the construction works. 	<ul style="list-style-type: none"> ● The potential for leakages due to the application of herbicides will be minimised by the application of best practice techniques in the handling and application of herbicides. Herbicides will not be stored along the railway line route and will only be transported to and from the line by personnel trained in their handling and application ● Surface water sewers will be provided to intercept surface water run off from the track. If the design requires that some of these sewers discharge into existing water courses, petrol hydrocarbon interceptors will be installed online to prevent harmful hydrocarbons and silt debris entering the watercourses. Similarly, surface water runoff from the proposed Park and Ride facility adjacent to the Cheeverstown Stop will be routed through petrol interceptors.

appendix 16a

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Air Quality & Climatic Factors	<ul style="list-style-type: none"> ● A dust minimisation plan will be formulated for the construction phase of the project. Dust mitigation measures which should be included in the Environmental Management Plan (EMP) are as follows: <ul style="list-style-type: none"> ● Site roads to be regularly watered and cleaned ● Vehicles using unpaved site roads to have their speeds restricted ● Site haul roads to be watered regularly ● Material stockpiles to be laid out in order to minimise exposure to wind ● Water misting or sprays to be used as required if particularly dusty activities are necessary during dry or windy periods ● During the movement of the materials with a potential for dust generation to/from the main site compound, trucks to be stringently enclosed or covered with tarpaulin or similar 	<ul style="list-style-type: none"> ● No mitigation measures are necessary during the operational phase.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
<p>Noise & Vibration</p>	<ul style="list-style-type: none"> ● In instances where proposed construction works are in close proximity to noise sensitive locations (e.g. along sections of Fortunestown Lane) reference will be made to BS5228: Noise control on construction and open sites, which offers detailed guidance on the control of noise & vibration from construction activities. ● In particular, it is proposed that various practices be adopted during construction where appropriate, including: <ul style="list-style-type: none"> ● Application of construction noise and vibration limits and limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; ● Establishing channels of communication between the contractor, developer, Local Authority and residents; ● Appointing a site representative responsible for matters relating to noise and vibration; ● Monitoring typical levels of noise and vibration during critical periods and at sensitive locations. ● It is envisaged that a variety of practicable noise and vibration control measures will be employed. These may include: <ul style="list-style-type: none"> ● Selection of plant with low inherent potential for generation of noise and vibration; ● Erection of barriers as necessary around items such as generators or high duty compressors; ● Location of noisy and vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary; ● All site access roads will be kept even so as to mitigate the potential for vibration from lorries. ● Where it is anticipated that construction noise levels may exceed the limits, or activities may occur outside the periods for which the any such limits have been recommended, the contractor will be obliged to present clear justification and details of mitigation measures proposed. ● Where night time works are required, the contractor will be obliged to notify local residents likely to be affected of the nature, duration and extent of the works. 	<ul style="list-style-type: none"> ● Proposed trams will be required to incorporate noise control measures in the design to comply with noise performance specifications and track and tram wheels will be maintained in good order. ● In order to reduce the risk of additional noise when light rail vehicles are moving around tight curves, anti wear and anti squeal measures will be applied to the rails. ● To reduce vibration transmission from the interaction of wheels on tracks to the ground through to sensitive areas (i.e. to nearest dwellings along Fortunestown Lane), vibration isolation techniques will be incorporated into the track and track-bed design.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
<p>Material Assets</p>	<ul style="list-style-type: none"> ● Excavation in the vicinity of existing AC watermains can give rise to problems following backfilling, leading to potential damage to the pipework. Given the importance of these trunk watermains it will be necessary to replace any sections of AC pipework encountered along the proposed Luas Line A1 alignment with concrete, ductile iron or steel pipework as appropriate. The details regarding the diversion of all watermains and drainage culverting and the adequate protection of all services under or adjacent the proposed route will be identified and agreed with the local authority in advance of any Luas Line A1 works. ● Where applicable, compensation will be payable to the property owners of acquired land and buildings, in accordance with the general compulsory purchase code. ● Where required, specific remedial measures will be put in place to protect the amenities of the existing residential properties in closest proximity to the alignment. These are addressed in the relevant sections of this EIS. ● Reinstatement of property boundaries at acquired land strips will be carried out upon completion of the construction of the LRT. ● In order to mitigate against construction impacts, the selected contractor will be required to prepare and implement a detailed construction plan. This plan will set out a proposed methodology and a programme of works for both during the hours of operation of the Red Line and during out of hours. This will demonstrate the manner in which the Belgard Stop will be reconfigured and how the connection to the existing operational system will be achieved with minimal disruption. The selected contractor will be required to consult with the Operator to make appropriate arrangements for those times where works may impact the service. 	<ul style="list-style-type: none"> ● To minimise interaction between the proposed Luas Line A1 and existing services, in the majority of cases additional ducting or pipes will be laid adjacent to existing services. Furthermore, given the potential for development of adjacent lands, additional crossings will be provided at various points along the alignment to cater for future crossings of the proposed Luas Line A1. ● Increased Passenger Demand - Projections of future demand produced by RPA having considered future year land use development in the area suggest that the system will be capable of catering for demand on the extended line with the suggested service pattern ● Reduced Service Frequency between Tallaght and Belgard - Surveys undertaken by RPA indicated that there is currently 80% spare capacity in the section of the Red Line between Tallaght and Belgard stops. This spare capacity is also set to remain with the capacity enhancements proposed for the Red Line as outlined above and which are currently underway. The service frequency could thus more than halve and still cater for demand required at Tallaght ● Increased Demand at Belgard Stop - With the introduction of Line A1 as a spur to the extended Red Line the Belgard stop will become an interchange point between services to and from Tallaght and to and from Saggart. Passenger numbers boarding and alighting services at this stop are thus expected to increase. The proposal to reconfigure the Belgard stop will facilitate shuttle services on the lines and also satisfy passenger stop requirements through sufficient passenger capacity at the reconfigured stop platforms.

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
<p>Transportation</p>	<ul style="list-style-type: none"> ● Two construction compound areas will be established for the duration of the construction period. These will be located on Fortunestown Lane and also immediately west of the junction of the Outer Ring Road with Embankment Road. These areas will be used to store construction materials and may also provide space for employee parking. ● Access to and egress from the construction compounds will only be possible by routes agreed between the contractor and South Dublin County Council Roads Authority. Three routes are being considered and these are via Garter Lane, via the N82 City West Road and via Cookstown Way/Road. Limiting construction traffic to these routes will assist in minimising any impact that occurs. A further reduction in impact could be achieved by reaching agreement with the Roads Authority on hours of operation outside of which construction traffic will be prohibited and by imposing restrictions on vehicle size and weight. ● Opportunities will be explored regarding the potential for limiting the numbers of employee vehicles travelling to and from the construction site on a daily basis. Possible solutions could include car sharing or transporting workers to site via pool cars and mini-buses from designated collection points (such as DART stations), or offering subsidised travel via public transport. ● Throughout the course of the construction period remedial measures will be implemented to ensure that an appropriate level of access is maintained to all adjoining land uses along the proposed route. This will involve on going consultations with the relevant landowners during the construction phase of the project. Temporary pathways and cycleways will be installed where appropriate and provision will be made to ensure access for the mobility impaired is maintained. Where they are needed, traffic management measures will be agreed with the roads authority prior to implementation. 	<ul style="list-style-type: none"> ● The capacity analysis undertaken as part of the transport assessment, discussed above, illustrated that once the tram was operational it would not impact significantly on the operation of the highway. No further mitigation is proposed. (See page 163)

(continued oveleaf)

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Transportation <i>(continued)</i>	<ul style="list-style-type: none"> ● Reinstatement of pavement and road surfaces that are disturbed as part of the construction process will be carried out where practical throughout the construction period. Access will also be maintained to existing public utilities (water, gas etc) where necessary. ● In order to address the issues outlined above, it is recommended that a Traffic Management Plan will be agreed between the roads authority and the contractor that will provide details of construction traffic routes and hours of operation, plus details of all remedial measures to be undertaken during construction. ● During the construction phase of the project, there will be on going monitoring of any impact and disturbance that occurs to existing land uses and activities. Public consultation and ongoing local liaison procedures will be established in the area to ensure that any queries from relevant parties are dealt with promptly and efficiently. 	
Electromagnetic Interference	<ul style="list-style-type: none"> ● No mitigation is required during the Construction Phase 	<p>The mitigation and monitoring issues recommended below are in accordance with best practice, and if implemented will ensure that the electromagnetic impacts of the proposed Luas Line A1 are insignificant.</p> <p>Any possible impact on the local environment will be addressed as part of an Electromagnetic Compatibility (EMC) Control Plan which will be prepared at the start of the project construction. The plan will set out the defined objectives and requirements for the designers, equipment suppliers and system installers to meet European legal EMC requirements, which limit the radiated emissions to levels that are acceptably low, and should not cause interference. Control will be achieved by compliance with the stated objectives and the results of all assessments will be presented in the EMC Control Plan documentation.</p> <p>Measurements of emissions from the substations and trams will be made and monitored to ensure compliance with the standards. The impact of the fields generated by Luas Line A1 will be considered prior to operations and additional measurements will be made of the electromagnetic fields close to overhead conductor system for comparison with international reference levels.</p>

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Electromagnetic Interference <i>(continued)</i>	<ul style="list-style-type: none"> No mitigation is required during the Construction Phase 	<ul style="list-style-type: none"> All electrical products and systems associated with the proposed Luas Line A1 will be supplied and installed to comply with the European Standard EN 50121 (Parts 1-5) (which addresses railway EMC. Part 2 of the standard is concerned with the interface between the railway system and the outside world and defines limits of emissions that are directed at the avoidance of interference. The compliance of supplied equipment with the EMC limits will be independently assessed and mitigation measures will be considered as a required design change and correctly installed for any observed non-compliances. This work will be performed prior to operations. The required degree of stray current monitoring will be determined and fully implemented during the system development, tram operations, and maintenance. Adequate verification of human exposure controls will be achieved through demonstration of safe conditions resulting from measurements and comparison with internationally accepted ICNIRP Guidelines. The interaction with other telecommunication systems will be addressed through consultation with these systems owners. The electromagnetic emissions from the trams and substations that could cause interference to neighbouring electrical and electronic systems along the route will be assessed in surveys both before and after development. The correct installation to good engineering practices will ensure that there is no interference to computers and information technology equipment in adjacent buildings, and will also provide protection of radio services. Studies of the electromagnetic effects of the design will identify the need for the incorporation of any required mitigation measures, and verification testing will be performed to confirm adequate performance. Good design in the form of insulated rails will be installed throughout and such measures will provide protection of buried piping and avoid corrosion.

appendix 16a

CHAPTER	MITIGATION MEASURES	
	Construction Phase	Operational Phase
Waste Management	<ul style="list-style-type: none"> ● A project specific C&D WMP for the construction phase has been developed based on design to date. The aim of this is to ensure effective waste management and recycling of waste generated as a result of the works. The C&D WMP takes into account the Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects, published by the National Construction & Demolition Waste Council in July 2006, on behalf of the Department of the Environment Heritage and Local Government. 	<ul style="list-style-type: none"> ● A WMS for the operation of the proposed Luas Line A1 has been developed. The aim of this is to ensure effective waste management and recycling of waste during the operational phase of Luas Line A1. This will be reviewed and developed in light of industry best practices in advance of the commencement of operations.

Note: The above is a summary of mitigation measures outlined in the various Chapters of this EIS. It is recommended that the table be read in conjunction with the overall assessment contained within these Chapters.