METROLINK

Integrated Transport. Integrated Life.

A16.2

Site Specific Potential for Construction Phase Dust Impacts

Contents

List of Abbreviations

Abbreviation	Definition
ACM	Asbestos-containing material
CEMP	Construction Environmental Management Plan
CTO	Calcareous shale limestone
EIAR	Environmental Impact Assessment Report
EPB	Earth pressure balance
HAS	Health and Safety Authority
HGV	Heavy goods vehicle
IAQM	Institute of Air Quality Management
TBM	Tunnel boring machine

1. Site Specific Potential for Construction Phase Dust Impacts

1.1 Introduction

This appendix of the Environmental Impact Assessment Report (EIAR) assesses the potential for construction phase dust impacts at the individual construction sites of the proposed Project on Air Quality. Section 1.2 reviews activities occurring on multiple sites that have the potential to generate dust. Sections 1.3 then reviews each of the significant construction sites individually within the geographical areas AZ1 to AZ4 for their potential to generate dust. The potential to generate dust will be considered under four main headings as per IAQM Guidance (IAQM 2014). These are: demolition, earthworks, construction and trackout.

1.2 Activities with the Potential to Generate Dust

This section provides an overview of the typical activities and methods that have potential for dust impacts during construction of the proposed Project. While each individual site compound will differ, the processes that have the potential for the generation of construction dust will be similar. This appendix should be read in conjunction with EIAR Chapter 16 (Air Quality) Section 16.3.5 which details the construction phase dust assessment criteria and with Appendix A16.4 (Dust Management Plan).

Further details on construction methods can be found in the EIAR Chapter 5 (MetroLink Construction Phase) which contains an overview of the typical activities and methods that are anticipated to be used during construction and commissioning of the proposed Project.

1.2.1 Vegetation Clearance

The clearance of vegetation from land is required at a number of sites. Cleared land has the potential to be a source of dust generation, as bare ground is susceptible to wind erosion. The potential for dust generation is higher during extended periods of dry conditions, combined with high winds which erode and entrain soil particles and carry them downwind.

The largest areas of vegetation clearance lie in the northern part of the Proposed Project for the construction of the Estuary Station and adjoining Park and Ride facility, construction of the Dardistown Depot and also where the alignment is at ground level or in retained cut. Here the current land uses include rural green field sites consisting of cultivated fields, hedges and trees, and a sports pitch just north of the future Dardistown Station. The Enabling Works will include the removal of trees, hedges and ground covering vegetation, earthworks for land levelling and preparation for foundations and underground structures, and temporary haul roads for access.

1.2.2 Concrete and Bentonite Batching

There are a number of sites where onsite concrete and bentonite batching will be required. Due to the nature of the raw materials required there is the potential for dust generation if batching plants are not maintained and run effectively. The batching plants are sealed silo units and best practice dictates the installation of a dust collector on the top of the silos which store the raw material in order to reduce the potential for dust pollution. The dust collector will be sized correctly and regularly maintained. In addition to ensuring that the batching plant is correctly sealed, loading bays for the raw materials will be enclosed to further reduce any risk of dust emissions.

Once mixed and ready for use in construction, both concrete and bentonite are worked as a wet mix or slurry and therefore do not pose a risk as a dust generating material.

1.2.3 Demolition

The demolition of a number of residential and commercial properties and other structures is required to facilitate the construction of the proposed Project. A summary of the main demolition requirements is provided in Table 5.7 of Chapter 5 (MetroLink Construction Phase) and reproduced below in Table 1.1.

Table 1.1: Summary of Main Demolition Requirements

Title	Demolition Category
Swords (Estuary, Seatown, Swords Stations)	Footbridges, community and residential properties: • Malahide Roundabout - 120m footbridge; • Chapel Lane, Swords - 64m footbridge; • R132 Swords Bypass, Mantua, Swords - 101m footbridge; • Seaview Bungalow - single storey house; • Seatown West Bungalow, Seatown West – single storey house; • Estuary Roundabout, Swords – 142m long footbridge; and • Lissenhall Great, Swords - residential building off Ennis Lane; and • Unofficial halting site.
Airside, Swords (Fosterstown Station)	Commercial/ industrial properties: • Retail unit at Airside Retail Park – 3-storey commercial building; • Airside HV substations* – 2 no. single storey buildings; and • Northwest of Airside Retail Park - communications tower. *Once the diversion and building structure to the new location is complete (as required).
Nevinstown West, Swords (Fosterstown Station)	Residential and commercial properties: • Nevinstown Lodge – single storey bungalow; and • East of Nevinstown Lane – residential two storey building, and • Boland Car Dismantler – 2 no. single storey bungalows and adjoining commercial land.
M50 (Dardistown Depot)	Community / industrial properties: • Whitehall Rangers Club house – single storey community building and adjacent portal frame structure; and • Sillogue Green Road – 2 single storey commercial warehouse buildings.
Santry Demense (Northwood Station)	Residential properties: • North of Santry Lodge Gatehouse – 2 storey residential building; • Santry Lodge Gatehouse (bungalow) – single storey residential building; • Old Ballymun Road opposite Gulliver's Retail Park – redundant single storey residential building, and • Old Ballymun Road opposite Gulliver's Retail Park – communications tower*. *Once the diversion and building structure to the new location is complete (as required)
Griffith Park	Community property: • Sports changing rooms and café.
Glasnevin Station	Commercial/industrial properties during Enabling Works and retaining walls and MGWR tunnel during Civil Works: • Prospect House, Prospect Road - commercial 2-storey building; • Des Kelly Interiors, 1A, Prospect Road - large 2-storey commercial/ industrial building; and • Brian Boru Public House, 5 Prospect Road – 2-storey building.

Title	Demolition Category
O'Connell Street Station (Metrolink and Developer delivered scenarios)	Commercial properties to be demolished: • 46-49 O'Connell Street Upper; and • 55-56 O'Connell Street Upper. Commercial properties to be partially demolished, maintained and supported: • 43 O'Connell Street Upper – building façade; • 44 O'Connell Street Upper – building façade; • 45 O'Connell Street Upper – building façade; • 52-54 O'Connell Street Upper – building façade; • 57 O'Connell Street Upper- building façade; and • 58 O'Connell Street Upper- building façade.
Tara Station	Commercial and residential properties: • Ashford House, Tara Street - large 8-storey office building; • Poolbeg Street - large 4-storey office building; • Markievicz Leisure Centre (includes College Gate Apartments) - 7-storey building; • 22 Luke Street - 4 storey residential building (disused); • 24 Townsend Street – 4 storey residential building (disused); and • 25 - 32 Townsend Street - 3 storey building.
Charlemont Station	Industrial/ commercial properties: • 19 and 19a Dartmouth Road - 2 storey commercial building; and • Existing boundary wall; a lane way wall west of Dartmouth Square West - northern half of the wall to be removed and reinstated after construction, southern section of the wall to be protected during construction.

Appendix A5.8 (General Approach to Demolition) provides detail on the demolition methodology and the Outline Construction Environmental Management Plan (Appendix A5.1) provides detail on the contractor(s) pre-demolition requirements, including conducting a detailed demolition study and a demolition plan for each property/ structure. This plan will take into consideration the potential for dust generation and nearby sensitive receptors. Surveys will be required to identify the location of any asbestos-containing materials (ACM) or other harmful substances, which will require removal in accordance with the Guidelines on ACM Management and Abatement by Health and Safety Authority (HAS) code of practice for demolition (BS6187). All work and disposal operations will be undertaken by licensed specialist contractors.

Aspergillus is a fungus that is found in soil and therefore has the potential to be made airborne during demolition or excavation. Aspergillus is of particular concern near hospital wards where immune suppressed patients are accommodated. A competent contractor will be appointed to prepare an Aspergillus Prevention Plan, which will take into account the National Guidelines for the Prevention of Nosocomial Invasive Aspergillosis During Construction/Renovation Activities (National Disease Surveillance Centre 2002). Research has found that dust suppression techniques also prevent the suspension of aspergillus successfully (Fournel et al. 2010). Survey and prevention works with respect to Aspergillus will take place before construction commences by a competent contractor in proximity to any sensitive buildings and in particular in proximity to the Mater Hospital, Rotunda and Tara Winthrop clinic. If pre-construction surveys indicate that Aspergillus is a risk, the prevention works will include sealing the windows to the façades that are in close proximity to the hospital to prevent fugitive dust entering the hospital through windows.

1.2.4 Site Vehicles and HGVs

A large portion of potential dust emissions from construction sites is due to site vehicles moving across temporary unpaved roads. There is greater potential for dust generation due to traffic movements in the northern section of

the proposed Project (AZ1) due to the proposed works at ground level, in open cut, retained cut, and cut and cover sections. Some larger sites within AZ3 (Dardistown Depot) and AZ4 (Glasnevin and Northwood) also have the potential to have short sections of unpaved temporary road which, if trafficked during dry conditions, have the potential to generate dust. Due to the underground nature of much of the works and space restrictions within the site compounds in the highly urbanised section AZ4 there will not be substantial sections of unpaved routes/road.

Heavy Goods Vehicles (HGVs) delivering or removing materials from site have the potential to track-out material on their wheels generating a nuisance dust on public roads. Deposition of this material typically occurs in close proximity to each site (up to 350m distance) and potential impacts may occur up to 500m from the site entrance on public roads, with potential impacts on sensitive receptors up to 50m from the impacted road (IAQM 2014). Once HGVs have travelled 500m from the site it is assumed they are no longer a significant source of dust. Hence, dust impacts due to track-out associated with construction HGVs is considered not significant on haul routes once past this 500m buffer from sites.

The main material movement requirements for construction of the proposed MetroLink are: excavated material (tipper), rebar (flat trailer), ready-mix concrete (HGV), bentonite (tanker), temporary props (flat trailer) and explosives (purpose made van). There is not a high risk of dust generation from materials carried, given the type of vehicles and the sheeting of tipper trucks carrying spoil. However, there is a potential risk from dust generated from track-out and wheel movements on site. Where possible, all site compounds will have a separate site entrance and exit with segregated vehicle and pedestrian routes within the site, unloading and holding areas, security and a wheel wash. The one-way system will reduce the need to complete turning movements on site which may cause additional agitation and resuspension of dust.

The construction traffic modelled for the road traffic emissions air quality assessment, described in the EIAR Chapter 16 (Air Quality) Section 16.3.6 was based on the peak construction month as the worst case. Modelling of the traffic impacts using the worst case month was conservative as the resultant impacts are compared to annual mean limits and traffic would usually be based on annual mean volumes rather than a peak month.

The predicted maximum daily HGV movements are presented in Table 1.2, which represent the worst-case day at each individual site. These maximum daily movements are unlikely to coincide along the route on any one day as construction works at each site will be progressing along individual programmes. The daily HGV movements from individual sites may also be significantly different from typical HGV numbers over the year and also during peak construction at the site. The estimated maximum daily HGV movements are compared with the IAQM criteria to assess the impact of track-out.

Table 1.2: Maximum Daily HGV Movements

Geographical Split	Site	Maximum Daily HGV Leaving Site
AZ1	Start to Seatown	86
	Seatown to Malahide	93
	Seatown Station	38
	Malahide to Pinnock	95
	Fosterstown Station	38
	Pinnock to Dublin Airport North Portal	107
	Swords Central Station	38
AZ2	Dublin Airport North Portal	30
	Dublin Airport	38
	Dublin Airport South Portal	25
AZ3	Dardistown	35
	Northwood	57
AZ4	Ballymun	43
	Collins Avenue	35
	Albert College Shaft	25
	Griffith Park	24
	Glasnevin	50
	Mater	39
	O'Connell Street	46
	Tara	40
	St. Stephen's Green	39
	Charlemont	33

1.2.5 New Road Construction

The construction of new roads is required at a number of sites including the proposed Park and Ride. New road construction works will typically include the following construction sequencing:

- Earthworks which may involve the removal of topsoil, along with any vegetation, cut and fill works, grading the area and levelling the ground;
- Installation of the utilities, surface water drainage system comprising pipes and chambers, as required, and connection to the designated outfall point;
- Laying of the road foundation material;
- Installation of any required kerbs and the drainage collector system, such as gullies, and lighting, signing and traffic signals; and
- Laying the road pavement material.

Cleared land and earthworks during the new road construction have the potential to be a source for dust generation. The potential for dust generation is particularly present during extended periods of dry conditions combined with high winds which can also lead to dust entrainment from cleared land.

1.2.6 Shallow Excavation Works

Shallow excavation works will be undertaken in AZ1 and AZ3 up to the Northwood Station. The removal of surface material and excavation has the potential for dust generation. Construction of the proposed Project permanent subsurface structures will commence with the installation of vertical walls from the surface in the form of concrete secant piles or diaphragm walls (D-walls). This will provide lateral ground support prior to the main excavation being carried out. Further detail on construction methods is provided in Chapter 5 (MetroLink Construction Phase) and Appendix A5.12 (Diaphragm Wall and Secant Piling Methodology).

Secant piled walls are formed by boring circular sections from the surface down into the top of the bedrock and filling the resulting opening with steel reinforcing cages surrounded by concrete. In water bearing ground, these piles are interlocked to provide a seal against potential leakage of water into the future structure. Secant piled walls will be used in the following works:

- Open cut – section of the alignment in shallow excavation (up to 2m deep), where the ground will be excavated to depth with a battered slope on all excavated edges. Sheet piles will be used to stabilise the ground where required.

- Retained cut – where alignment excavations are greater than approximately 4m, the cut will be supported by secant piling and propping as required. There are four retained cut stations: Seatown, Swords Central, Fosterstown and Dardistown.

- Cut and Cover – similar to retained cut but with a deeper excavation to allow room for a roof slab that will allow surface activities to continue (e.g. access roads). The sections of cut are covered permanently because the alignment passes close to some private properties and roads. Cut and cover tunnels also use piles and have the addition of a roof slab and reinstatement of surfacing.

The typical construction sequence for a secant pile wall involves forming a piling platform to support the activities, constructing a shallow guide wall for the piles, installing the first set of primary piles using a piling rig, followed by the installation of a second set of piles which overlap with the first set of piles to form a continuous retaining wall, removing the guide walls and placing a concrete pile cap on top of the wall. This construction method seals the side slopes. A roof slab will be constructed and placed over the cut and cover sections as soon as possible during construction in order to reopen the roads above at ground level. This slab and resurfacing will reduce the potential for dust emissions from the construction activities.

The excavated material will be taken by site dump truck to one of the site compounds where it will be stored temporarily and then loaded onto road going tippers for transport to a local facility for disposal or recycling.

Diaphragm walls or ‘D-walls’ are similar to secant piles in that they are excavated from the surface and then filled with reinforcing steel and concrete. However, they are constructed as rectangular sections of trench, rather than circular piles, and bentonite is always used to support the ground before concreting. Diaphragm walls will be used to construct the station boxes, intervention shafts and tunnel portals.

The methodology proposed to safely excavate the station boxes will also reduce the potential for dust generation. Diaphragm walls will be installed first, followed by the excavation for the station box, followed by casting the roof slab. Once the roof slab has been placed into position the potential risk from dust dispersion is minimised as the roof stab acts as a dust control measure.

A trench cutter (hydrofraise) will be used to cut out the trench in advance of the installation of the diaphragm works. This machine has a hydraulically operated centrifugal mud pump which is mounted just above the cutter wheels. The mud pump continuously conveys the removed material, known as slurry, to the surface and then to the treatment plant. Due to the high percentage of moisture in the material removed by the hydrofraise there is a low risk of dust generation through this activity provided the percentage moisture remains high. In addition to dust mitigation, space restrictions at site compounds will mean that the material related to the diaphragm wall construction will be moved off-site as soon as possible to a licensed facility for processing and where possible recycling and reuse.

Bentonite will be used to seal the excavations. A bentonite mixing and storage area will be set up, including silos to store sufficient bentonite to carry out the works. After the foundation works have been completed, the bentonite plant and foundation equipment will be demobilised.

Bentonite is an absorbent-swelling consisting predominantly of smectite minerals. The property of bentonite to swell on contact with water makes it useful as a sealant, since it provides a self-sealing, low-permeability barrier as part of the diaphragm walls. These properties also mean the mix has a high moisture content which reduces the potential risk for dust generation once mixed with water to form a slurry. The mixing of bentonite slurries will be undertaken in enclosed or shielded areas.

Once the diaphragm wall is constructed, the roof slab will then be cast in sections, leaving the necessary openings to facilitate top-down construction. For construction of the station box it is necessary that sufficient permanent or temporary holes are left through the roof slab (which will be designed to allow for construction plant loads) to facilitate the follow-on activities of excavation, prop installation and removal, and concreting.

The main materials removed during excavation will be Brown Boulder Clay, Rock and Calcareous Shale Limestone. Rock will be removed using localised drilling and blasting, or by excavators with mechanical breaking. Excavation within Calcareous Shale Limestone (CTO) is expected to be completed with the use of blasting.

Clays have a high slit content (~29%) (EEA 2019) which will be prone to suspension when dry due to their small particle size, with higher silt contents in the top 1.2 m of soil. However, soil moisture content greatly influences the dust generation potential. Clay has a higher moisture content and therefore reduced potential for dust emissions provided they do not dry out. Limestone has a low slit content (~1%) as per USEPA AP42 Aggregate Handling and Storage Piles (USEPA 2006) and therefore it is less prone to suspension when dry.

Excavated material will be lifted out of the station box initially by excavator, then by long reach excavator and at lower depths by a crane hoisting a large bottom opening skip. During the movement of the excavated material there is the potential for suspension of dust.

Temporary material storage areas stores will be established and monitored. These areas will ensure materials are stored in a manner to reduce any potential for dust generation. However, in general, excavated material will be placed directly into tipper-type HGVs for transport to the final offsite disposal point. This reduces the potential for dust generation from stockpiles of excavated material.

1.2.7 Controlled Blasting

Blasting will only be carried out by a licensed contractor in line with a detailed Dust Minimisation Plan, the Blasting Strategy (refer to Appendix A5.20) and the Construction Environmental Management Plan (refer to the outline CEMP, Appendix A5.1). Well-designed blasting will reduce the potential for dust impacts.

In order to minimise dust emissions during explosions, blast mats will be used and all openings through the roof slab covered as required. Once the blast has occurred, broken rock will be moved to a lift out location and during this activity water sprays will be used as required to minimise the release of dust into the air. During drilling, the rock remaining against the diaphragm walls will be carefully broken off by one or more small 360-degree tracked excavators fitted with mechanical breakers (drum cutter) – this approach is preferable to blasting from a dust generation point of view. Where required water sprayers can be used to minimise dust generation. Where horizontal drilling is required similar dust mitigation measures will be put in place to prevent the generation and spread of dust emissions.

Blasting conditions can vary within an individual station, so all blasts will be monitored and any trends or step changes in ground vibration monitored and considered in the next blast design.

Fumes extracted from the excavation immediately following a blast must be discharged to the atmosphere in such a way as not to cause harm to others, this will be ensured by the licensed contractor. This will require the careful siting of the ventilation discharge (location and height) and may require some treatment (e.g. scrubbing) of the discharged air. A review of any potential impact will be conducted by the licensed blasting contractor and monitored throughout any blasting activities.

Flyrock (also called rock throw) is the uncontrolled propelling of rock fragments produced by blasting. Proper blast design is the most important tool to prevent blasting problems, including flyrock. Blasting mats will be used as the final mitigation measure to cover the blasting area to prevent flyrock. Blast designs will also take into account the desire to re-use excavated material and will try to minimise large boulders requiring re-blasting or large percentages of fines.

1.2.8 Tunnel Boring Machine (TBM) Spoil

The TBM will launch from Dublin Airport South Portal for the Airport Tunnel and from Northwood for the City Tunnel. TBM spoil will be removed from Northwood and Dublin Airport South Portal. A variable density type TBM is proposed to be used due to the varying soil and rock type along the route. This variable TBM will use different methods; slurry and Earth Pressure Balance (EPB), which are discussed in detail in Chapter 5 (MetroLink Construction). The main concern with respect to construction dust is the potential for dust generation when spoil reaches the surface.

EPB spoil is removed from the head chamber of the TBM by an Archimedean screw. Excavated material will be transported out of the tunnel on a conveyor. Through the injection of a variety of additives into the head chamber, the loosened spoil is 'conditioned' to form a plasticized, homogenised impermeable soil paste. The additives remain mixed in with the excavated spoil and are not separated out but are highly biodegradable with 95% degraded within 28 days. They do not present an environmental hazard and no treatment plant is required for this material. However, due the nature of the conditioned spoil, it is sometimes necessary to contain the spoil in a bunded area to allow the foaming agent to degrade. The amount of excavated material containing bentonite that is predicted to be generated is approximately 52,445 tonnes, this takes into account losses into the ground and soil during the boring process. On completion of all tunnelling works this excavated material containing bentonite will be classified as non-hazardous waste and require disposal at an appropriately licensed waste facility.

A slurry TBM generates a bentonite suspension (bentonite and excavated material) which is a spoil material. The spoil and bentonite mixture is removed from the cutting head and is then pumped back along the tunnel to the surface where the bentonite fluid is separated from the excavated material. The bentonite slurry is recycled and pumped back into the tunnel for re-use after treatment at a surface level separation and treatment plant.

An Excavated Materials Management Strategy has been prepared for the proposed Project and included within the EIAR as Appendix A24.1. As far as possible, excavated material will be reused within the proposed Project for the construction of embankments, in backfill, and for bunding and landscaping requirements. The remaining surplus excavated material will not be reusable within the proposed Project. This material will therefore require management off site, either as a by-product or as a waste, as detailed in Chapter 24 of the EIAR (Materials and Waste Management).

Huntstown Quarry in County Dublin has been identified as the preferred location to accept the excavated material classified as a by-product. It has been predicted that approximately 89% of the excavated material could be accepted at Huntstown Quarry. The excavated material will be transported by lorries with suitable covers to prevent wind erosion of material in transport. The site is located just outside the M50 Motorway near Junction 5, approximately 5.5km from the Northwood Portal location.

Tunnelling and associated activities (such as removal of excavated material, supply of materials and maintenance of tunnelling equipment) will be carried out on a 24 hour a day, seven days a week basis. Where reasonably practicable, material would be stockpiled within the compound boundary for removal during normal working hours.

1.2.9 Stockpiles

If required, the construction compound site at Northwood will be the temporary storage location for excavated material throughout the Construction Phase of the proposed Project. However, where possible excavated material

will be placed directly into tipper-type HGVs for transport to its final destination. While being retained on-site, the excavated material will be properly managed and stored in order to reduce potential impacts associated with dust.

Stockpiles may be a source of airborne dust due to the entrainment of dry material by the wind. Where stockpiles are present, the US EPA's AP 42 handbook states that freshly processed aggregate has the highest potential for dust emissions. Stockpiles and aggregates for the MetroLink sites will mainly consist of excavated soil and blasted rock.

As stockpiles are left on sites they weather and moisture causes aggregation and cementation of fines to the surfaces of larger particles creating a surface which is less susceptible to wind erosion. Rainfall infiltrates into the interior of the stockpile, which may drain slowly and help to keep the stockpile moist. The risk of dust entrainment from stockpiles can be reduced during periods of dry weather by spraying water on the surface.

1.2.10 ESBN Cables

Power will be provided from the Electricity Supply Board Network (ESBN). Two new primary high voltage (HV) supply substations will be provided at DANP and at the Dardistown Depot. The two new high voltage substations will be supplied by way of new underground cable routes from existing substations in the area. The cables will be installed by ESBN. These cable route connections do not form part of the proposed Project but are evaluated in this EIAR on the basis of the best and most up-to-date available information.

The excavations required for the installation of the cables have the potential to generate dust. The final routes are not chosen and therefore some route options are present, where options have the potential for higher sensitivity or magnitude of dust the worst-case option is chosen. Wherever practical, the excavations for the new cables will be carried out at the same time as other necessary utility diversions to minimise dust generation.

1.3 Potential for Construction Phase Dust Impacts by Area

1.3.1 Overview

Tunnelling will take place under Dublin Airport and under Dublin City from Northwood to just south of Charlemont and this will result in large quantities of excavation material being generated. In addition, excavation of station boxes, open cut, and cut and cover sections of the proposed Project will result in large quantities of excavated soil, stone and made ground. For further details on excavation activities refer to Chapter 5 (MetroLink Construction Phase). There will also be significant quantities of excavated material generated during the construction of the proposed Project. The predicted excavation material quantities are based on the design and the vertical alignment determined for both the tunnelling and surface works. At O'Connell Street Station there are two potential construction scenarios due to the potential over site development at this location. However, for the MetroLink project the quantities of material excavated by MetroLink would be the same for both scenarios.

Table 1.3 provides the forecast quantities of excavated material likely to be generated by the proposed Project by location. The location of construction compounds is shown on Figure 5.1, accompanying Chapter 5 (MetroLink Construction Phase).

Table 1.3: Estimated Quantity of Excavated Material

Section	Estimate of Excavated Material Quantities (m^3)			
	Soil	Mixed	Rock	Total
Start of route to Seatown Station	108,790	-	2,941	111,731
Seatown Station to Malahide Roundabout	102,896	-	13,250	116,146
Malahide Roundabout to Pinnock Hill Roundabout	121,625	-	3,821	125,446
Pinnock Hill Roundabout to North Portal	161,590	-	4,055	165,645
Central Section Surface Works	281,818	-	7,950	289,768
Dardistown Station	incl above	-	incl above	-
Dardistown Depot	280,677	-	-	280,677
Bridges, Viaducts	6,404	-	-	6,404
Northwood Station	48,522	1,500	26,521	76,543
Ballymun Station	48,372	1,500	27,157	77,029
Collins Avenue Station	37,806	1,500	37,201	76,507
Griffith Park Station	33,011	1,500	55,137	89,648
Glasnevin Station	120,682	1,500	18,448	140,630
Mater Station	58,724	1,500	24,310	84,534
O'Connell Street Station	98,506	1,500	20,966	120,972
Tara Station	11,107	1,500	60,343	72,950
St Stephen's Green Station	19,600	1,500	65,763	86,863
Charlemont Station	36,151	1,500	47,944	85,595
Dublin Airport Station	6,530	1,500	67,730	75,760
TBM Tunnels	204,121	138,802	473,561	816,484
Northwood Portal	12,597	-	10,800	23,397
Dublin Airport North Portal	11,353	-	139	11,492
Dublin Airport South Portal	40,743	-	-	40,743
Albert College Park Shaft	17,031	-	4,607	21,638
South of Charlemont Shaft	2,530	-	879	3,409
Park & Ride	24,530	-	1,047	25,577
Total Excavated Material	**1,895,716**	**155,302**	**974,570**	**3,025,588**
Backfill required (Dardistown Depot), plus assumed material kept on site for bunds, landscaping and the like at Park & Ride	-	-	-	**99,931**
Total Surplus Excavated Material	-	-	-	**2,925,657**

1.3.2 Potential for Construction Phase Dust Impacts in AZ1

The works within AZ1 are above ground or within shallow excavation and therefore have been assessed as linear sections. Within the AZ1 area sixteen construction stage compounds and logistics areas are required, as shown in Diagram 1 below.

Diagram 1.1: AZ1 Northern Section – Principal Elements and Construction Compounds

1.3.2.1 Dust Impacts: Estuary to Seatown

The proposed Estuary Station is situated at the northern end of the route at chainage 0+235. This station will be built at grade, that is at ground level, adjacent to a new three storey 3,000 vehicle Park & Ride facility.

One main construction compound is required at Estuary Station and three satellite construction compounds for this section: Estuary Court, Seatown West, and Fingallian Footbridge. This section will also include the Broadmeadow and Ward Rivers Viaduct.

Demolition

The following structures are to be demolished as part of the Enabling Works prior to the main construction works commencing:

- Lissenhall Great, Swords - residential building off Ennis Lane
- 2 no. residential properties at Seatown West
- Estuary Roundabout, Swords – 142m long footbridge
- R132 Swords Bypass, Mantua, Swords - 101m footbridge

In accordance with the criteria discussed in Chapter 16 (Air Quality) Section 16.3.5, the magnitude of dust emissions for the proposed demolition activities is classified as medium, due to the volume of structures to be demolished and the geographic spread of the demolition areas.

Construction

The construction works in this section will include:

- Estuary Station;
- Estuary Park and Ride;
- Traction substation;
- Broadmeadow and Ward River Viaduct.
- Retained cut at Seatown West;
- Cut and cover box crossing the R132 Swords Bypass; and
- Cut and cover section east of R132 Swords Bypass.

South of Estuary Station, two embankments (circa 3.5m high) will be constructed to allow for the development of the Broadmeadow and Ward River Viaduct spanning both rivers. Earthworks for embankments will include the bulk movement and transfer of excavated and/or fill material. Haul routes will be required, constructed and sequenced as the embankment construction progresses.

On completion of the viaduct, as the embankment moves down to ground level, a shallow excavation and a sheet piled excavation (U-section) will be required in order to bring the track down into a cut and cover section under Estuary Roundabout.

South of Balheary Park, the alignment then passes into a retained cut before entering a cut and cover tunnel section under Estuary Roundabout and the R125 Castlegrange Road.

Following the completion of the main civils works, the Estuary site will be converted to a railhead. This will include the installation of a concrete batching plant for track bed installation. Concrete batching will take place 24 hours, 7 days a week.

In accordance with the criteria discussed in Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as large due to on site concrete batching.

Earthworks

The lateral support for all structures along this section is provided by secant piles. The majority of the bulk excavation will be in the brown and black boulder clays, with some bulk excavation in the transition and rock layer. The amount of excavation expected in rock and transition layers is minimal in comparison to the excavation across the clay layers. Hydraulic hammers are to be used to break the layer prior to removing the material with excavators. Blasting, which has the potential to be a source of dust, is not expected to be needed in this section.

Estuary Station will be built at grade. Piling works for the station are anticipated, however no major excavation works or retaining structures will be necessary for the construction of Estuary Station.

A total estimated volume of 111,731m^3 of material will be excavated. Approximately 44,000m^2 of existing vegetation is to be cleared prior to establishing the construction sites.

In accordance with the criteria discussed in Chapter 16 (Air Quality) Section 16.3.5 the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

It is assumed that the spoil will be removed directly by wagon wherever possible. There will be some instances along the route where spoil will be transported back to one of the key construction sites by dumper.

During the peak construction period it is anticipated that there will be greater than 50 HGV movements along this section (Start to Seatown). In accordance with the criteria discussed in Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large (Table 16.42) due to the stretches of unpaved road that will be required for the construction of the Proposed Project and maximum number of construction HGV movements.

1.3.2.2 Dust Impacts: Seatown to Malahide Roundabout

One main construction compound is required at Seatown Station and six satellite construction compounds for this section (chainage 1+600 to 2+526): Woodie's, Mantua Park, North Dublin Corporate Park, Chapel Lane, Pavillion's Shopping Centre. Seatown Station is between chainages 1+770 and 1+835.

Demolition

The following structures will require demolition:

- Malahide Roundabout - 120m footbridge; and
- Chapel Lane, Swords - 64m footbridge.

In accordance with the criteria discussed in Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as medium, due to the volume and height to be demolished and the geographic spread of the demolition areas.

Construction

Seatown Station will be built in a retained cut. The construction and installation of secant pile walls, permanent props and roof slab will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed station construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

Seatown Station will be built in a retained cut. A large amount of excavation for the station will be in black and brown boulder clay layers with equipment suitable for breaking any boulders found.

After Seatown Station, the track alignment will ascend in a retained cut southward alongside the R132 Swords Bypass towards the Swords Central Station. Cut and cover construction will be used along the green area to the west of Ashley Avenue. The proposed Project alignment will continue south in a cut and cover section past the residential properties and under Malahide Road Roundabout.

Approximately 42,000 m^2 of existing trees and vegetation are to be cleared prior to establishing the construction sites. Secant piling is required for all structures in this section from Seatown Station to the Malahide Roundabout, this activity has the potential to generate dust during installation.

Excavation of approximately 116,146m^3 of material is anticipated along the section Seatown Station to Malahide Roundabout. Approximately 102,896m^3 of material is estimated to be in soft clays, with the remainder in rock. Hydraulic hammers will be used but blasting is not expected to be needed in this section.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period for the Seatown to Malahide Roundabout Section it is anticipated that there will be more than 50 HGVs daily leaving the site.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude dust emission magnitude from track-out activities is classified as large due to the stretches of unpaved road that will be required for the construction of the Proposed Project and the maximum number of construction HGV movements.

1.3.2.3 Dust Impacts: Malahide Roundabout to Pinnock Hill Roundabout

The works along this section (chainage 2+526 to 3+600) will require one main construction compound, one satellite compound and one lorry holding/logistics area, with a working area along the proposed alignment. Swords Central Station is within this section located at chainage 2+738 to 2+803 and will be built in a retained cut.

Demolition

There are no properties along this section of the route that require demolition.

Construction

From Malahide Road Roundabout, the approach to Swords Station includes sections of retained cut through a greenfield site running parallel and adjacent to the R132 Swords Bypass.

Swords Central Station will be built in a retained cut as per the methodology detailed in Chapter 5 (MetroLink Construction Phase). For the station a steel support frame will be constructed with prefabricated cladding panels. A new footbridge will be installed to connect the Swords Pavilion with the new station.

From Swords Central Station, the alignment will continue in a retained cut until it reaches Pinnock Hill Roundabout, with the exception of cut and cover sections at Fujitsu and at an access into a greenfield area. The alignment then continues into a cut and cover tunnel under the Pinnock Hill Roundabout.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed station construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

Approximately 10,000 - 15,000m^2 of existing trees, vegetation and fields are to be cleared prior to establishing the construction sites.

Secant pilling works will be required in this section. The majority of excavation for the section will be in the black/brown boulder clay layer, with a minimum amount through transition and rock layer. No blasting is expected. The use of hydraulic hammers will be required for the rock layers.

Six sections of retained cut will require excavation in the section between Malahide Roundabout and Pinnock Hill Roundabout. Exposed cut sections have the potential for dust emissions however as described earlier, the construction method will minimise this potential.

Excavation of approximately 125,446m^3 of material is estimated to be required for the section Malahide Roundabout to Pinnock Hill roundabout.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be more than 50 HGV outward movements per day along this section as indicated in Table 16.31 of Chapter 16.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the stretches of unpaved road along the rail track alignment that will be required for the construction of the Proposed Project and maximum number of construction HGV movements.

1.3.2.4 Dust Impacts: Fosterstown

The route alignment between Pinnock Hill roundabout and North Portal extends from chainage 3+600 to 5+020. The works along this section will require one main construction compound at Fosterstown Station and three satellite compounds (Nevinstown Lane, Boland and the North Portal), in addition with a working area along the track section.

Demolition

The following structures are to be demolished at Fosterstown Station prior to commencing the works:

- Retail unit at Airside Retail Park – 3-storey commercial building;
- Airside HV substations* – 2 no. single storey buildings; and
- Northwest of Airside Retail Park - communications tower.

The following structures are to be demolished at Nevinstown West prior to commencing the works:

- Nevinstown Lodge – single storey bungalow; and
- East of Nevinstown Lane – residential two storey building, and
- Boland Car Dismantler – 2 no. single storey bungalows and adjoining commercial land.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as medium, due to the volume to be demolished and the geographic spread of the demolition areas.

Construction

Fosterstown Station will be built in a retained cut as per the methodology detailed in Chapter 5 (MetroLink Construction Phase). For the station a steel support frame will be constructed with prefabricated cladding panels.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed station construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

Within this section there are approximately 66,000m^2 of existing trees and vegetation is to be cleared prior to establishing the construction sites.

The lateral support for all subsurface structures along this section is to be provided by secant piles. A large volume of the bulk excavation will be in the brown and black boulder clays and it will be undertaken using excavators equipped with facilities for breaking of any boulders found. The remaining volume of the bulk excavation will be in the transition and rock layer; therefore, hydraulic hammers are to be used to break the layer prior to removing the material with excavators. Therefore, blasting, which has the potential to be a significant source of dust, is not expected to be needed in this section.

An estimated total of 165,645m^3 of material is to be excavated for the alignment along this section.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements along this section (Pinnock Hill Roundabout to North Portal) will occur.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the stretches of unpaved road that will be required for the construction of the Proposed Project and maximum number of construction HGV movements.

1.3.3 Potential for Construction Phase Dust Impacts in AZ2

This section of the proposed Project includes Dublin Airport North Portal, the tunnel underneath Dublin Airport, Dublin Airport Station and Dublin Airport South Portal. It also includes the smaller diameter evacuation and ventilation tunnels running parallel to the Airport Tunnel. In this section three construction stage compounds are required, as shown in Diagram 1.2:

- Dublin Airport North Portal Compound;
- Dublin Airport Main Station Compound; and
- Dublin Airport South Portal Compound.

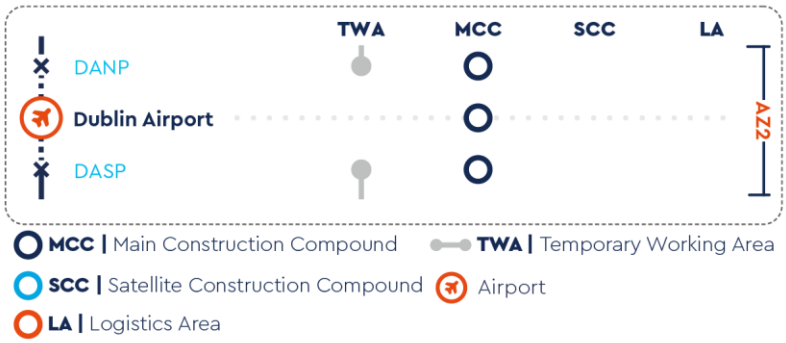

Diagram 1.2: AZ1 Airport Section – Principal Elements and Construction Compounds

1.3.3.1 Dust Impacts: North Portal

Dublin Airport North Portal, which includes the Intervention Shaft, is located on the Naul Road to the north of the airport perimeter fence (between chainages 5+011 and 5+042). The plan form of the portal has been designed as a square enclosure, having internal dimensions of 28m long and 17m wide. In cross-section, the DANP will comprise concrete diaphragm walls 1.2m thick and 25.5m deep, encasing an inner concrete structure to support the horizontal precast beams.

Demolition

The proposed North Portal site is located in an area where no demolition of existing properties is required.

Construction

No station or buildings are located at the North Portal site. Surface construction will consist of emergency exits, fire fighter entrance points and hardstanding to provide a safe area for the evacuation of passengers in the event of an incident.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small.

Earthworks

The proposed construction site area is approximately 37,900m^2. Most of the proposed land is currently unoccupied agricultural land. The site area requires enabling works and ground levelling due to the topography of the site area prior to portal construction. The site will require a storage area for materials.

The excavation of the portal is anticipated to be within Black Boulder Clay (QBL) and bottom of the secant piles to be in transition of Soil and Rock (QTR). Excavation of the portal is not expected to encounter significant amounts of rock.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at North Portal Site. The site will have separate access and egress locations.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.3.2 Dust Impacts: Dublin Airport

The Dublin Airport Station is located within the Dublin Airport perimeter (but not 'airside'), in an area that is currently the Terminal 2 (T2) short term car parking. This underground station is between chainages 6+998 and 7+113 and will be approximately 115m in length and 24m wide (external).

Demolition

The proposed Dublin Airport Station lies within an open-air short-term airport carpark, with no existing properties to be demolished.

Construction

The construction will involve top down construction with a roof slab. This will mean there is no open excavation and the potential for dust is reduced. Precast units will be installed to form the station platforms.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the above ground construction volume, use of precast and of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The total site area is 10,900m^3. 82% of the station excavation is anticipated to be within grey micritic limestone rock. Details on the potential dust impact from the installation of diaphragm walls, drilling, blasting and excavation were discussed in Section 1.2 of this Appendix. These activities will be required for the proposed underground station at Dublin Airport.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at this site.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the number of HGV moments required for the construction of the proposed Project and maximum number of construction HGV movements.

1.3.3.3 Dust Impacts: South Portal

Dublin Airport South Portal (DASP), which includes the Intervention Shaft, is located to the south of the Old Airport Road (between chainages 7+353.4 and 7+423.4). The DASP will comprise a concrete box 70m long, of variable width, and 16m high surrounded by concrete diaphragm walls 1.2m thick and 31m deep. It will be covered with a concrete top slab 1.3m thick.

Demolition

The proposed South Portal site is located in an area where no demolition of existing properties is envisaged.

Construction

No station or buildings are located at the South Portal site. Surface construction will consist of emergency exits, fire fighter entrance points and hardstanding to provide a safe evacuation area.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small.

Earthworks

The portal will comprise a TBM launching shaft, established using a cut and cover methodology. The proposed construction site area is approximately 83,700m^2. Most of the proposed land is currently unoccupied agricultural land. The site area requires enabling works and ground levelling due to the topography of the site area prior to portal construction. The site will require a storage area for materials.

The excavation of the portal is anticipated to be within Black Boulder Clay (QBL), there is no expected rock at the portal location.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the South Portal site. The site will have a separate access and egress locations.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.4 Potential for Construction Phase Dust Impacts in AZ3

From south of DASP to the Northwood Portal, the AZ2 section includes the proposed Dardistown Depot, the M50 viaduct crossing and the proposed construction compound and TBM launch site at Northwood. This section will include open, retained cut and cut-and-cover sections. The AZ2 section will require the following construction compounds:

- Dardistown Station and Depot;
- Central Section Surface Works at M50 Viaduct;

- St Anne's South of M50 Viaduct;
- Northwood Station and Portal; and
- Northwood Logistics Yard.

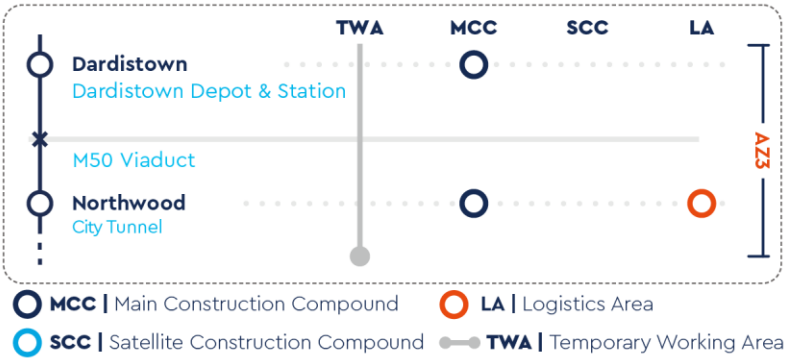

Diagram 1.3: AZ3 Central Section – Principal Elements and Construction Compounds

1.3.4.1 Dust Impacts: Dardistown (Future Station) and Depot

The Dardistown Depot is connected to the main alignment by two connecting tracks which head east out of the depot. The tracks will mostly be in retained cut prior to joining the main alignment, with an overpass of the main alignment by the southbound track prior to descending into the retained cut. Dardistown Depot is located to the west of the future Dardistown Station.

Between the Dardistown Depot and M50 Viaduct there will be a mixture of cut and cover, retained cut, and battered excavation and fill.

Demolition

Demolition of the following buildings within the station area is required:

- Whitehall Rangers Club house – single storey community building and adjacent portal frame structure; and
- Sillogue Green Road – 2 single storey commercial warehouse buildings.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as small, due to the volume to be demolished and the geographic spread of the demolition areas.

Construction

There are 6 main buildings included in the depot area, these are: Stabling, Workshop, Administrative Building, Electrical Building, Maintenance Building and the Access Control Building. Prefabricated cladding panels installed into steel framework will form the main workshops and industrial buildings, these do not have a high potential for dust emissions. The administration building is a proposed reinforced concrete building. There is a total building gross area of 47,000 m^2, given the average heights of the buildings this will volume of above 100,000m^3. In addition, a permanent access road will be required.

The Dardistown Construction Compound will also be used as a railhead site during the Construction Phase. This will require a large servicing yard, storage and laydown area and access for the loading and unloading of work-trains, test trains and rolling stock. These activities will mostly be contained within the footprint of the proposed Dardistown Depot and Station development site; however, an additional area of land to the west is expected to be required for a concrete batching plant during the second stage track bed installation. Concrete batching will take place 24 hours, 7 days per week.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as large due to the scale of the construction activities and on site concrete batching.

Earthworks

The proposed construction site area for Dardistown Station is approximately 405,100m^2. It is envisaged that the piled walls are all placed from a level at (or just below) the existing ground surface. The volume of material requiring excavation is estimated at 280,677m^3.

The first 1.5m of excavation from ground level is anticipated to be through man-made ground with the remaining excavation to formation at both inside and outside of the secant pile area likely to be in Black Boulder Clay (QBL). Transitional rock is present from 16-20 m in depth with Grey to black calcareous shale present below 20m. Excavation is expected to use tracked 360-degree excavators (with a hydraulic hammer for the mechanical breaking of any boulders found).

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Dardistown site.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the stretches of unpaved road that will be required for the construction of the Proposed Project and maximum number of construction HGV movements.

1.3.4.2 Dust Impacts: M50 Viaduct

The proposed M50 Viaduct consists of a three-span composite steel beam and in situ concrete deck bridge over the existing M50 motorway between chainage 9+656 and 9+755. The alignment will be in retained cut to the south and north of the bridge. The M50 is not considered to be a sensitive receptor as it is a transient area where travellers would pass the proposed M50 Viaduct site quickly.

1.3.4.3 Dust Impacts: Northwood (Portal and Station)

The proposed Northwood Station is located adjacent to and encompasses R108 Ballymun Road. The construction site will include land on both sides of R108 Ballymun Road and adjacent to St Margaret's Road.

The portal construction works and the station works from the west of the R108 Ballymun Road will be supported from the Northwood Station and Portal Main Construction Compound. This area is located in an open, greenfield site, away from residential and commercial development. The construction site footprint will change throughout the construction timeframe but will generally consist of two main sites. The East Site is located east of R108 Ballymun Road and the West Site is located to the west of R108 Ballymun Road and south of St Margaret's Road.

A logistics site will be located north of St Margaret's Road. This area will provide space for offices, welfare and construction logistics for the TBM tunnelling works from Northwood to DASP, including the temporary storage of excavated material.

Demolition

Demolition of the following residential properties is required at Santry Demense prior to construction of the Depot:

- North of Santry Lodge Gatehouse – 2 storey residential building;
- Santry Lodge Gatehouse (bungalow) – single storey residential building;
- Old Ballymun Road opposite Gulliver's Retail Park – redundant single storey residential building, and
- Old Ballymun Road opposite Gulliver's Retail Park – communications tower*.

*Once the diversion and building structure to the new location is complete (as required)

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as small, due to the volume to be demolished.

Construction

Northwood is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

The TBM for the City Tunnel will be launched and driven south from Northwood Portal site and therefore it is the main construction site for this zone. For this reason, there is an increased potential for dust impacts with respect to construction dust. Concrete for the laying of first stage track bed will be batched on-site at Northwood. Concrete batching will take place 24 hours, 7 days per week.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as large due to the significant works ongoing at this site, including concrete batching, bentonite slurry treatment and excavated material storage.

Earthworks

The Northwood Sation and Portal construction compound is approximately 63,500m^2. It is predicted that there will be approximately 76,543m^3 of excavated material generated from the construction of Northwood Station. The bottom approximately 45% of the station excavation is anticipated to be in rock, and this is expected to require blasting to facilitate excavation. Blasting will be conducted by a licensed contractor with strict dust minimisation strategies in place. The first 12m of excavation from ground level is anticipated to be in Brown Boulder Clay (QBR). Excavation is expected to use an excavator (with a facility for the mechanical breaking of any boulders found) in 2 to 3m stages.

A slurry treatment plant related to the operation of the TBM in slurry mode will be required at this location. The TBM generates a bentonite suspension (bentonite and excavated material) which is pumped back along the tunnel to the surface for treatment. The bentonite slurry is recycled and pumped back into the tunnel for re-use after treatment at a surface level separation and treatment plant.

Excavated EPB spoil material will be transported out of the tunnel on a conveyor. The excavated material is then transferred across site to the storage stockpile or, where possible, removed from site without stockpiling. Due to the plasticized state of the material from the additives required it has a low potential for dust emissions. However,

mitigation measures will be put in place to ensure dust impacts are avoided. A total volume of 816,484m^3 of excavated material is anticipated to be generated from the construction of the TBM tunnels.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Northwood site. The site entrances will be directly onto Ballymun Road (R108) and exit will be onto St. Margaret Road. It is also anticipated that the exact locations of these entrances and exits will need to change as the works progress. The site is of sufficient size to receive delivery vehicles within the hoardings to minimise the impact of vehicles idling and causing congestion on the local roads during offloading. However, a small holding bay under 1 km from site will still be required to manage gate access and check delivery credentials ahead of accessing site.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5 Potential for Construction Phase Dust Impacts in AZ4

Works proposed in the AZ4 (City Section) will include the underground tunnelling from Northwood to Charlemont, the construction of nine underground stations, one interchange station at Glasnevin, an intervention shaft at Albert College Park and intervention tunnel at Charlemont. The required construction compounds to carry out the construction works falling within AZ4 are:

- Ballymun Station Main Compound;
- Collins Avenue Station Main Compound;
- Albert College Ventilation Shaft Main Compound;
- Griffith Park Station Main Compound;
- Glasnevin Station and Interchange Main Compound;
- Mater Station Main Compound;
- O'Connell Street Station Main Compound;
- Tara Station Main Compound;
- St Stephen's Green Main Compound; and
- Charlemont Station Main Compound.

Diagram 1.4: AZ4 City Section – Principal Elements and Construction Compounds

1.3.5.1 Dust Impacts: Ballymun

The station is to be located adjacent to the west side of the Ballymun Road (R108), opposite the Ballymun Civic Centre. The surface footprint of the station partially covers an existing building and car park at the former Ballymun Town Shopping Centre, which has been demolished by DCC. The new underground station is to be between chainages 10+200 and 10+310 and will be approximately 110m in length and 24m wide (external).

Demolition

The proposed Ballymun Station is in an area where no further demolition of existing properties is envisaged. DCC has already completed demolition of the former Ballymun Town Shopping Centre.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

Excavation is expected to use tracked 360-degree excavators (with a facility for the mechanical breaking of any boulders found), excavating along the station in a north to south direction. The first 18m of excavation from ground level is anticipated to be through Man-made ground / Brown Boulder Clay, which then transitions into a zone of Soil / Rock. It is expected that excavation at this stage will be carried out by localised drilling and blasting, or by

excavators with mechanical breaking. The last 6m of excavation is anticipated to be within Calcareous Shale Limestone (CTO). 77,029m^3 of material is anticipated to be excavated for the construction of Ballymun Station.

It is expected that blasting will be used in this section. Blasting will be conducted by a licensed contractor, a review of any potential impact will be conducted by the licensed blasting contractor and monitored throughout any blasting activities. Blasting may be required for excavation of the rock in the bulk station excavations.

Due to space availability on this site, there will be a materials storage area that will also service nearby restricted sites. There will also be a concrete batching and bentonite plant on this site. In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Ballymun Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.2 Dust Impacts: Collins Avenue

The station will to be located beneath Ballymun Road, at the junction with Albert College Court, close to the Our Lady of Victories Church in Whitehall. This underground station is between chainages 12+159 and 12+267 and will be approximately 110m in length and 24m wide (external).

Demolition

No demolition is required for construction of the proposed Collins Avenue Station.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities can be classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The first 12m of excavation from ground level is anticipated to be in Brown Boulder Clay. Excavation is expected to use an excavator (with a facility for the mechanical breaking of any boulders found) in 2 to 3m stages. The next 12m below the clay, it is anticipated to be in a transition zone of Soil / Rock. It is expected that excavation at this stage will be carried out by localised drilling and blasting or by excavators with mechanical breaking. The last 5m of excavation is anticipated to be within Calcareous Shale Limestone and Argillaceous limestone.

Blasting may be required for the bulk station excavations. Blasting will be conducted by a licensed contractor, a review of any potential impact will be conducted by the licensed blasting contractor and monitored throughout any blasting activities.

76,507m^3 of material is anticipated to be excavated for the construction of Collins Avenue Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Collins Avenue Station. In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements

1.3.5.3 Dust Impacts: Albert College Park

The site at Albert College Park is an intervention and ventilation shaft. This shaft is necessary due to the distance between the Collins Avenue and Griffith Park stations. The shaft structure is located between chainages 11+723.6 and 11+766 and will be 42.4 m in length and 19.4 m wide (external).

The construction compound will be located in Albert College Park between Collins Avenue Station and Griffith Park Station on the east side of R108 Ballymun Road and immediately north of Hampstead Avenue.

Demolition

No demolition is required on this site.

Earthworks

The proposed construction site area is approximately 6,300m^2. The site has Brown Boulder Clay to a depth of roughly 16m with a layer of limestone beneath. The total depth will be around 33m at this location. Blasting may be required as part of the proposed works. The excavated volume arising from piled walls and open excavation is anticipated to be 21,638m^3.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Construction

The same construction principles for the underground stations apply to Albert College Park shaft with the following exceptions: secant piles will be used for forming the shaft rather than D-walls; and the shaft will require two 23m long connection tunnels from the shaft, connecting to the main tunnel constructed using the Sprayed Concrete Lining technique (SCL). This consists of cycles of excavation followed by the application of shotcrete (sprayed concrete), rockbolts and steel girders.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small.

Track-out

The site entrance and exit have the same location. During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Albert College Park Shaft.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.4 Dust Impacts: Griffith Park

The station is to be located on land currently occupied by Home Farm Football Club on the east side of St. Mobhi Road (R108), to the north of the Tolka River, south of the Na Fianna GAA pitches and immediately west of Whitehall College of Further Education. This underground station is between chainages 13+751 and 13+865 and will be approximately 116m in length and 24m wide (external).

Demolition

The proposed Griffith Park Station site will be located on land occupied by Home Farm Football Club. Demolition of the sports club changing rooms and café are required as part of the Enabling Works.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as small, due to the volume to be demolished.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The Griffith Park Station construction site area is approximately 11,700m^2, with 89,648m^3 of material requiring excavation for the station construction. This includes excavation for the diaphragm walls and open excavations. It is anticipated that 55,137m^3 will be in rock with the remainder in soft material. Blasting may be required for the bulk station excavation due to the rock present on site. Blasting will be conducted by a licensed contractor, a review of any potential impact will be conducted by the licensed blasting contractor and monitored throughout any blasting activities.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Griffith Park Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.5 Dust Impacts: Glasnevin

The station is to be located at the intersection between Royal Canal Way and R108. This station will be located underground, beneath existing buildings which are to be demolished and the existing railway cuttings. This underground station is between chainages 14+807 and 14+916 and will be approximately 103m in length and 39m maximum wide (external). The station development includes the construction of the new Metrolink station, platforms for two commuter railways - the Western Commuter Line (old MGWR) and the South Western Commuter Line (old GSWR), and a concourse area to connect all three railways.

Demolition

The proposed Glasnevin site will require the demolition of commercial/industrial properties during the Enabling Works and retaining walls and a MGWR tunnel during the Civil Works:

- Prospect House, Prospect Road - commercial 2-storey building;
- Des Kelly Interiors, 1A, Prospect Road - large 2-storey commercial/ industrial building; and
- Brian Boru Public House, 5 Prospect Road – 2-storey building.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as large, due to the volume to be demolished. The railway infrastructure to be demolished is below ground level.

Earthworks

This site compound has an area of 53,400m^2. The site has made ground to a depth of 2m followed by Brown Boulder Clay to a depth of about 27m with a layer of transition rock up 31m with limestone beneath. The volume of excavated material is expected to be 140,630m^3 for diaphragm walls, station box excavation and secant piles. The construction will involve top-down construction with a roof slab. This will mean there is no open excavation and the potential for dust is reduced.

In addition, during construction at Glasnevin there will be a requirement for the closure of the Royal Canal and drying out of the canal basin to create a working area. Drying out of the canal has to the potential to create an additional source of dust with the potential for resuspension during windy periods if left unmanaged.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Construction

As prefabricated cladding panels will be installed in a steel support frame with the majority of the construction occurring underground for the station there is reduced risk of dust impacts. However, in accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as large due to the required track realignments and other work associated with this site that significantly increase the construction dust potential.

Track-out

Due to the constrained size of the site, a small additional site will be required as a lorry holding area. Two entrances and exits to the site will be provided, one to the north of the railway tracks and one to the south. Traffic coming to site from the north will turn right from Prospect Road (R108) into the site. Most traffic leaving the site will be heading north, and after turning left out of the site will travel up Finglas Road, turning right into Prospect way, on to Botanic Road, St. Mobhi Road and Ballymun Road towards the M50 which is approximately 6km away. During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Glasnevin

Station. The proposed site entrances will be from Prospect Road (R108) and will be adjusted several times during the phasing of the works.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.6 Dust Impacts: Mater

The station is to be located beneath the Four Masters Park to the north west of St. Joseph's Church bounded by both Eccles Street and Berkeley Road. The surface footprint of the construction site occupies a large portion of the Four Masters Park and will require some temporary closures of both Eccles Street and Berkeley Road to complete the construction works. This underground station is between chainages 14+523 and 14+634 and will be approximately 110m in length and 25m wide (external). An additional site will be required for material storage and a lorry holding area and a suitable building will be required to be rented for offices and welfare.

Demolition

The proposed Mater Station is located in an area where no demolition of existing properties is envisaged.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

This site compound has an area of 5,400m^2. The site has Brown Boulder Clay to a depth of about 20m with a layer of limestone beneath. The excavated volume of material arising from the construction of diaphragm walls and open excavation is expected to 84,534m^3. Due to the presence of rock at this location, blasting is expected to be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Mitigation measures will be put in place to control the risk of construction dust entering the Mater Hospital site which utilises passive ventilation on Eccles Street. Refer to Chapter 16 (Air Quality) for detail of mitigation measures and

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Mater Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.7 Dust Impacts: O'Connell Street

The station is to be located on the western side of O'Connell Street in Dublin City Centre. The site is occupied by a variety of three and four storey buildings utilised as retail units at the ground floor along O'Connell Street with offices and back of house facilities above. There is also a cinema (Carlton Cinema). This underground station is between chainages 16+589 and 16+726 and will be approximately 140m in length and 24m wide (external).

This station will follow two potential construction scenarios due to a potential over-site development at this location. One scenario will include the over-site development of a mixed-use quarter that will occur before the construction of the O'Connell Street Station and the second scenario will be based on an assumption that the mixed-use quarter does not go ahead.

Demolition

A number of existing buildings and structures would require demolition to facilitate the development, however, others would be subject to conservation, refurbishment and adaptive reuse. Under Scenario One, these works would be undertaken by the developer at the outset of their own development and prior to the MetroLink works.

A summary of properties to be demolished, maintained and supported (under both Metrolink and the Developer delivered scenarios) is provided below:

Commercial properties to be demolished:

- 46-49 O'Connell Street Upper; and
- 55-56 O'Connell Street Upper.

Commercial properties to be partially demolished, maintained and supported:

- 43 O'Connell Street Upper – building façade;
- 44 O'Connell Street Upper – building façade;
- 45 O'Connell Street Upper – building façade;
- 52-54 O'Connell Street Upper – building façade;
- 57 O'Connell Street Upper- building façade; and
- 58 O'Connell Street Upper – building façade.

Commercial properties not for demolition and supported;

- 59 O'Connell Street Upper – whole building;
- 60 O'Connell Street Upper – whole building;
- 19 Henry Place – reading room and associated structure;
- 42 O'Connell Street Upper – whole building; and
- Rear of 55 to 57 O'Connell Street Upper – existing wall onto Moore Lane.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as large, due to the volume to be demolished and the geographic spread of the demolition areas.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

There are no existing trees located on the station site, however it is understood, as part of the urban realm development, several existing trees on the west side of O'Connell Upper Street footpath will have to be removed. Permission to fell/remove the trees will be required from the appropriate authority.

The scale of earthworks required at this site by the main MetroLink contractor is dependent on whether the oversite development by Hammersons (DCLP) proceeds. If the Hammersons (DCLP) development proceeds, it is currently proposed that they construct the station box and develop the station and surrounding area in advance of TBM arrival and MEP station fit out works. This will result, in the scenario where the over-site development proceeds, in the majority of the earthworks being completed prior to the Metrolink contractor coming on site. If the over-site development Hammersons (DCLP) does not proceed a greater scale of earthworks will be required by the MetroLink contractor. In order to be conservative, it is assumed that the over-site development does not proceed when calculating the potential for dust emissions.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed site area and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the O'Connell Street station. The entrance and the exit to the main compound will be on O'Rahilly Parade. Vehicles will follow a one-way system to enter and exit the compound. A lorry holding area will be accommodated on a secondary site on the west side of Moore Lane.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.8 Dust Impacts: Tara

The station is to be located at the intersection between Townsend Street and Tara Street, next to the existing Tara Street DART railway station. This underground station is between chainages 17+352 and 17+455 and will be approximately 105m in length and 26m wide (external). Tara Station is the seventh station along the TBM drive from Northwood.

Demolition

The proposed Tara Station will be located on land occupied by various residential and commercial premises including derelict buildings and a local leisure centre. It is assumed that the site is acquired with the buildings vacant for demolition. However, the owner may demolish the buildings in advance of the handover. In order to be conservative it is assumed the buildings are not demolished prior to handover. The commercial and residential properties to be demolished comprise:

- Ashford House, Tara Street - large 8-storey office building;
- Poolbeg Street - large 4-storey office building;
- Markievicz Leisure Centre (includes College Gate Apartments) - 7-storey building;
- 22 Luke Street - 4 storey residential building (disused);
- 24 Townsend Street – 4 storey residential building (disused); and
- 25 - 32 Townsend Street - 3 storey building.

Due to the constrained space available at the Tara Construction Compound, Appendix A5.9 illustrates the demolition approach at this complex and sensitive location. Pre-demolition surveys will be undertaken to confirm which of the assessed proposed methodologies will be employed and provide sufficient detail to allow the full management of the demolition and resulting materials.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as large, due to the volume to be demolished and the geographic spread of the demolition areas.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed station construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The construction site has a total area of 7,300m^2. At Tara Station approximately 68% of the diaphragm wall will be constructed in potentially strong, stable rock (Lucan Limestone). Above this is a layer of boulder clay, with made ground above this again. Due to the presence of rock at this location, blasting is expected to be required. A total of 72,950m^3 of excavated material is anticipated at Tara Station.

Temporary storage on site is limited and, in general, excavated material will be placed directly into vehicles for transport to the final disposal point. Similar to other sites, a small additional site is likely to be required as a lorry holding area to control the flow of HGVs into site.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed volume of material removed and earthwork activities is classified as large.

Track-out

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at Tara Street Station.

A small additional site is likely to be required as a lorry holding area, to control the flow of HDVs into site (preventing queuing on the public road). The location for this is to be determined in co-ordination with the local authorities as planning work continues.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.9 Dust Impacts: St. Stephen's Green

The station is to be located on the east side of St. Stephen's Green in Dublin City Centre. This underground station is between chainages 18+414 and 18+523 and will be approximately 115m in length and 24m wide (external).

Demolition

There are no structures required to be demolished for the construction of St. Stephen's Green Station.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed station construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The construction site has a total area of 6,000m^2. At St. Stephen's Green Station approximately 68% of the diaphragm wall will be constructed in potentially strong, stable limestone rock. Some blasting will be required at the site but blast designs will consider the desire to re-use excavated material and will try to minimise large boulders requiring re-blasting or large percentages of fines. Above this is a layer of boulder clay (from 2 to 7 m in depth), with made ground above this again. It is anticipated that 86,863m^3 of material will require excavation at this location.

Temporary storage on site is limited and excavated material will need to be removed frequently. The material will be stockpiled on site temporarily, to even out the numbers of HGV movements per day. When possible, excavated material will be placed directly into vehicles for transport to the final disposal point.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed volume of material removed and earthwork activities is classified as large.

Track-out

The proposed site access / egress routes from and to the M50 will be via the Dublin Port Tunnel. There will be a shared site entrance and exit with segregated vehicle unloading, holding areas and a wheel wash.

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the St. Stephen's Green Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.5.10 Dust Impacts: Charlemont

The station is to be located just south of the city centre and adjacent to existing office buildings, the Luas Green Line and to the rear of properties on Dartmouth Square West. Dartmouth Road is located on the southern side of the site, with Grand Parade and the Grand Canal on the north side. This underground station sits between chainages 19+289 and 19+398 and will be approximately 110m in length and 23m wide (outer diaphragm wall).

The site currently has existing planning permission for a commercial development (Two Grand Parade). Planning permission was granted to Hines in April 2019. The existing permission requires the developer to facilitate the proposed Project by constructing a structural deck founded on bored secant piles which will form the central section of the Charlemont station box roof slab. The development (comprising a new office block and basement car park) and the refurbishment of an existing office building to be retained, will occupy an area of approximately 3,300m². It is anticipated that the new development and the existing six storey office block fronting on to Grand Parade will be occupied during station construction.

Demolition

To facilitate the MetroLink station construction, the following structures will require demolition:

- 19 and 19a Dartmouth Road - 2 storey commercial building; and
- Existing boundary wall; a lane way wall west of Dartmouth Square West - northern half of the wall to be removed and reinstated after construction, southern section of the wall to be protected during construction.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed demolition activities is classified as small, due to the volume to be demolished.

Construction

This is an underground station and therefore the majority of works will occur below ground. Construction at surface level will include a station entrance, concrete upstand, a steel support frame to secure the entrance glazing panels and canopy. In addition, emergency exit and firefighting entrance locations will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small. This is due to the construction volume and use of prefabricated cladding panels which will be installed on a steel support frame which have a low potential for dust emission.

Earthworks

The construction site area is 4,200m^2. A total of 85,595m^3 of material is anticipated to be generated from the construction of diaphragm walls, secant piling and excavation at Charlemont Station. Some blasting will be

required at the site but blast designs will consider the desire to re-use excavated material and will try to minimise large boulders requiring re-blasting or large percentages of fines. The top layer of soil is considered to be made ground, below this is a layer of boulder clay (from 2 to 12m in depth). From 12 to 16m there is a layer of transition soil/rock. With Lucan Formation limestone below 16m in depth.

Temporary storage on site will be limited, and excavated material will need to be removed frequently. The material will be stockpiled on site temporarily, to even out the number of HGV movements per day. When possible, excavated material will be placed directly into vehicles for transport to the final disposal point.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed volume of material removed and earthwork activities is classified as large.

Track-out

The proposed site access / egress routes are from the R111 through Haddington Road, Bath Avenue and on to the R131 at Ringsend, north over the Tom Clarke bridge to the East Wall and on to the M50. There will be a shared site entrance and exit with segregated vehicle unloading, holding areas and a wheel wash.

During the peak construction period it is anticipated that there will be greater than 50 HGV movements at the Charlemont Station.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as large due to the maximum number of construction HGV movements.

1.3.6 Potential for Construction Phase Dust Impacts from ESBN Cable Routes

Power will be provided from the Electricity Supply Board Network (ESBN) at 110kV. For the operation of the proposed Project, two new primary high voltage (HV) supply substations will be provided at DANP and at the Dardistown Depot. The two new high voltage substations will be supplied by way of new underground cable routes from existing substations in the area. The cables will be installed by ESBN through public roads or public lands as far as possible. These cable route connections do not form part of the proposed Project but are evaluated in this EIAR on the basis of the best and most up-to-date available information. The final routes are not chosen and therefore some route options are present, where options have the potential for higher sensitivity or magnitude of dust the worst-case option is chosen.

1.3.6.1 Dust Impacts: ESBN Cable Route for Dublin Airport North Portal Connection

Demolition

No demotion is required for either of the Dublin Airport North Portal ESBN cable options.

Construction

There will be two physical interfaces between MetroLink and ESBN. The site required for the ESBN side of the substation will be approximately 85m x 35m with a two-storey building 48m x 15m which will be approximately 15m in height. The site required for the MetroLink side will be approximately 48m x 70m which will be divided in two areas. The proposed construction of the substation involves brickwork housing on a concrete slab foundation, steel pylons and precast concrete trestles.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small.

Earthworks

In order to lay the cable, ESBN will require excavations along the linear route option chosen. The work will be conducted by ESBN contractors. It is likely that spoil will be both removed directly into wagons and taken offsite wherever possible due to the confined works areas. Once laid the cables will be covered in a layer of crushed rock and road surfaces will be reinstated.

Due to the length of the route options the site area will each exceed 10,000m^2, however due to their linear nature of the cable routes the receptors only have the potential to be impacted by a limited area of the cable routes i.e. up to 350m with respect to earthworks.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5 and considering the potential area for impact and applying a conservative width of excavation, the dust emission magnitude for the proposed site area and earthwork activities is classified as medium.

Track-out

Both cable options follow paved roads but have the potential to require short lengths of unpaved roads for access at the proposed substation connection point. These will be between 50 and 100m. ESBN will be carrying out the work associated with the cable routes and currently the potential HGV movements are unknown. During the peak construction period a conservative estimate is that more than 10 but less than 50 HGV moments per day will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as medium due to the potential length of unpaved roads and HGV movements.

1.3.6.2 Dust Impacts: ESBN Cable Route for Dardistown Depot

Demolition

No demotion is required for either of the Dardistown Depot ESBN cable options.

Construction

There will be two physical interfaces between MetroLink and ESBN. The site required for the ESBN side of the substation will be approximately 85m x 35m with a two-storey building 48m x 15m which will be approximately 15m in height. The site required for the MetroLink side will be approximately 48m x 70m which will be divided in two areas. The proposed construction of the substation involves brickwork housing on a concrete slab foundation, steel pylons and precast concrete trestles.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude for the proposed construction activities is classified as small.

Earthworks

In order to lay the cable, ESBN will require excavations along the linear route option chosen. The work will be conducted by ESBN contractors. It is likely that spoil will be both removed directly by wagon and taken offsite wherever possible due to confined works areas. Once laid the cables will be covered in a layer of crushed rock and road surfaces will be reinstated.

Due to the length of the route options the site area will each exceed 10,000m^2, however due to their linear nature of the cable routes the receptors only have the potential to be impacted by a limited area of the cable routes i.e. up to 350 m with respect to earthworks.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5 and considering the potential area for impact and applying a conservative width of excavation, the dust emission magnitude for the proposed site area and earthwork activities is classified as medium.

Track-out

Both cable options follow paved roads but have the potential to require short lengths of unpaved roads for access at the proposed substation connection point. These will be between 50 and 100 m. ESBN will be carrying out the work associated with the cable routes and currently the potential HGV movements are unknown. During the peak construction period a conservative estimate is that more than 10 but less than 50 HGV moments per day will be required.

In accordance with the criteria discussed in the EIAR Chapter 16 (Air Quality) Section 16.3.5, the dust emission magnitude from track-out activities is classified as medium due to the potential length of unpaved roads and HGV movements.