

Project

Strategic Housing Development at Lissywollen, Athlone, Co. Westmeath

Report Title

Construction and Environmental Management Plan (CEMP)

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1 INTRODUCTION TO PROPOSED DEVELOPMENT

This Construction & Environmental Management Plan (CEMP) is for the works associated with the construction of a proposed Strategic Housing Development at Brawny Road, Lissywollen, Athlone, Co. Westmeath.

The proposed site (i.e. that within the red line boundaries detailed on the below site location map) is generally bounded to the north by the N6, and to the south by the Old Rail Trail Greenway. To the west, the site is bounded by Scoil na gCeithre Máistrí primary school and the facilities of the Athlone Regional Sports Centre. The eastern boundary of the site is defined by an old boreen road further east of which lies undeveloped greenfield lands, ESB Regional Headquarters and Athlone Training Centre (formerly known as FÁS).

The proposed site is a 'Greenfield' site and the development seeks to provide for the construction of 576 no. residential units, childcare facilities, a community hub, open space and all associated site and infrastructural works. It is located approximately 1km from Athlone town centre and has an area of 17.64ha.

The western portion of the development slopes in a south westerly direction at an approximate gradient of 1 in 230. The eastern portion of the development slopes in a north easterly direction at an approximate gradient of 1 in 165. There are existing surface water and foul networks that traverse the site.



Figure 1.1 – Site Location – Athlone, Co. Meath

The development will consist of:

1. 576 no. residential units comprising of:
 - 285 no. 2 storey detached, semi-detached & terraced houses comprising 50 no. 4 bedroom houses, 200 no. 3 bedroom houses & 35 no. 2 bedroom houses
 - 8 no. apartments & duplexes (4 no. one beds & 4 no. three beds) in Block A (3 storeys);
 - 8 no. apartments & duplexes (4 no. one beds & 4 no. three beds) in Block B (3 storeys);
 - 15 no. apartments (15 no. two beds) in Block C (3 storeys);
 - 16 no. apartments & duplexes (7 no. one beds, 5 no. two beds & 4 no. three beds) in Block D (3 storeys);
 - 9 no. apartments & duplexes (5 no. one beds, 1 no. two bed & 3 no. three beds) in Block E (3 storeys);
 - 8 no. apartments & duplexes (4 no. one beds & 4 no. three beds) in Block F (3 storeys);
 - 4 no. apartments (4 no. one beds) in Block G (2 storeys);
 - 12 no. apartments & duplexes (12 no. three beds) in Block H (3 storeys);
 - 21 no. apartments (21 no. two beds) in Block K (3 storeys);
 - 36 no. apartments (36 no. two beds) in Block L (5 storeys with 5th storey setback);
 - 20 no. apartments & duplexes (6 no. one beds, 6 no. two beds & 8 no. three beds) in Block M (4 storeys with 4th storey setback);
 - 27 no. apartments (27 no. two beds) in Block N (3 storeys);
 - 43 no. apartments & duplexes (14 no. one beds, 24 no. two beds & 5 no. three beds) in Block O (2 to 4 storeys);
 - 12 no. apartments (6 no. one beds & 6 no. 2 beds) in Block P (3 storeys);
 - 8 no. apartments & duplexes (4 no. two beds & 4 no. three beds) in Block Q (3 storeys);
 - 18 no. apartments (6 no. one beds & 12 no. two beds) in Block R (3 storeys);
 - 12 no. apartments & duplexes (6 no. two beds & 6 no. three beds) in Block S (3 storeys);
 - 14 no. apartments (4 no. one beds & 10 no. two beds) in Block T (3 storeys).
2. 1no. community hub located on the ground floor of the Block D.
3. 2 no. crèches comprised of a 2 storey crèche located on the ground and first floors of Block C and a 1 storey crèche on the ground floor of Block T.
4. Construction of basement level car parking forming part of Block L.

5. Two vehicular accesses, one at Brawny Road, the other connecting to the at-present unnamed road parallel to the ESB Networks Depot which will connect to the Garrycastle roundabout on the R916.
6. Construction of an east-west access road through the application site from the Ballymahon roundabout (on the R915 – to the west) to the Garrycastle roundabout (on the R916 – to the east). Which is to be delivered as part of the objectives for the Lissywollen South Framework Plan 2018-2024, and all associated road development works.
7. All associated site development and infrastructural works including amenity spaces, landscaping, open space, boundary treatments, vehicular parking, bicycle parking, utilities, internal roads, footpaths and shared surfaces, playground, site clearance and temporary construction development.

The CEMP addresses noise and vibration, traffic management, working hours, pollution control, dust control, road cleaning, compound/public health facilities and staff parking associated with the construction works.

2 COMPOUND FACILITIES/PARKING

The compound shall be entirely within the site boundaries. Site accommodation to be provided will include suitable washing / dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc. Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure.

The compound shall be constructed using a clean permeable stone finish and will be enclosed with security fencing. A permeable hardstand area will be provided for staff parking and these areas will be separate from designated machinery / plant parking.

A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.

A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

3 TRAFFIC MANAGEMENT & ACCESS

As part of Construction Stage Safety Plan for the works, prior to commencement of development and following receipt of a grant of planning permission, a Traffic Management Plan (TMP) will be prepared in accordance with the principles outlined below and shall comply at all times with the requirements of:

- Chapter 8 of the Department of the Environment Traffic Signs Manual, current edition, published by The Stationery Office, and available from the Government Publications Office, Sun Alliance House, Molesworth Street, Dublin 2;
- Guidance for the Control and Management of Traffic at Road Works (June 2010) prepared by the Local Government Management Services Board;
- Any additional requirements detailed in the Design Manual for Roads and Bridges & Design Manual for Urban Roads & Streets (DMURS)

The site will be accessed from the existing site entrance Brawny Road to the north-west of the site and from the unnamed road adjacent to the ESB depot to the east of the site. Traffic volumes are not anticipated to be significant and turning movements into the site shall be accommodated without delay. Warning signage will be provided for pedestrians and other road users on all approaches in accordance with Chapter 8 of the Traffic Signs Manual and the Contractor's Traffic Management Plan.

All construction activities will be governed by a Construction Traffic Management Plan (CTMP), the final details of which will be agreed with Westmeath County Council prior to the commencement of construction activities on site. The principal objective of the CTMP is to ensure that the impacts of all building activities generated during the construction phase upon the public (off-site), visitors to the subject site (on-site) and internal (on-site) workers environments, are fully considered and proactively managed/programmed thereby ensuring that safety is maintained at all times, disruption is minimised and undertaken within a controlled hazard free/minimised environment.

During the general excavation of the foundations and basement there will be additional HGV movements to and from the site. All suitable material will be used for construction and fill activities where possible and appropriate. All spoil material will be removed to a registered landfill site.

There will be further HGV movements to and from the site for importation of fill which will be required beneath houses, driveways and to roadways (structural fill). Importation of fill will also be required in areas, to raise the ground levels throughout the site to those specified in the drainage design.

In addition to the traffic generated by the movement of subsoil to and from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be during

off-peak hours. Such trips would generally be spread out over the full working day and are unlikely to be higher than the peak hour predicted for the operational stage.

Construction traffic will consist of the following categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff. On-site employees will generally arrive before 07:30, thus avoiding the morning peak hour traffic. These employees will generally depart after 18:00. It should be noted that a large proportion of construction workers would arrive in shared transport. The site is accessible by public transport to and from Athlone Town Centre using the A1 and A2 Bus Eireann services.
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready-mix concrete and mortar, concrete blocks, miscellaneous building materials, etc. Deliveries would arrive at a steady rate during the course of the day. It is estimated that peak delivery rates would be in the region of 1 - 2 deliveries per hour throughout the day.

In the absence of a final construction programme it is difficult to assess the exact impact during the construction period. Nevertheless; the following estimates have been made in respect of the construction period impacts:

- Appropriate on-site or off-site car parking and compounding will be provided to prevent overflow onto the local network. Parking in nearby residential estates shall be strictly prohibited.
- It is likely that some numbers of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential.
- During the period of excavation and disposal off site, it is likely that up to 2 no. truck trips per hour (on average) will be generated by vehicles removing unsuitable spoil from the site to allow for the construction of the development and for the removal of demolition waste.

The site offices and compound will be located within the site boundary.

3.1 Reductive/Mitigation Measures

Traffic Management during Construction: -

A Traffic Management Plan will be prepared prior to the commencement of construction work on site. This plan will be prepared in consultation with Westmeath County Council in order to agree on traffic management and monitoring. Measures are outlined below:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.

- The surrounding road network will be signed to define the access and egress routes for the development.
- The traffic generated by the construction phase of the development will be strictly controlled in order to minimise the impact of this traffic on the surrounding road network.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- All employees and visitor's vehicle parking demands will be accommodated on-site.
- A programme of street cleaning of Brawny Road (northern entrance) and the R916 including the Garrycastle Roundabout (eastern entrance) will be implemented.

4 Road Cleaning/ Wheel Washing

Provision will be made for the cleaning by road sweeper etc. of all access routes to and from the site during the course of the works, within 500m of the site boundary. Gullies will be inspected regularly for build-up of silt and cleaned accordingly. A wheel wash facility will also be provided on site to clean site traffic leaving the site when conditions require. Waste water generated at this washing facility will be suitably treated on site and all settled silts disposed offsite to licensed landfill.

All road sweeping vacuum vehicles will be emptied off site at a suitably licensed facility.

5 Working Hours

For the duration of the proposed infrastructure works it is envisaged that the maximum working hours shall be 07:00 to 19:30 Monday to Friday (excluding bank holidays) and 08:00 to 14:00 Saturdays, subject to the restrictions imposed by the local authorities. No working will be allowed on Sundays and Public Holidays, unless express permission is obtained from the Local Authority.

6 Construction Methodology

6.1 Demolition

As the site is a greenfield site no extensive demolition works are noted across the site. Any waste generated as part of site clearance will be managed as per the waste management plan (see 6.5).

The Applicant was informed at the pre-application consultations that there may be existing foul infrastructure located within the western portion of the site for a previous planned development – since abandoned. However, there are no records available from Westmeath County Council regarding these and the Applicant has been unable to confirm same. Further investigatory work is to be undertaken following receipt of planning approval to determine the presence/location of this infrastructure. Where possible this existing infrastructure will be incorporated into the design. Any infrastructure found to be redundant will be decommissioned and removed.

6.2 Protection of Adjacent Areas

Work areas will be segregated from the adjacent public areas for the extent of the project by means of a suitable hoarding fence. All hoardings will be designed by a competent Structural Engineer to resist wind loads.

All materials being hoisted by crane or other means will be controlled using guide ropes where possible.

6.3 Excavation and Rock Breaking

A specialist ground works contractor will be appointed to carry out the excavation and any rock breaking works that may be required. The appointed specialist contractor will carry out a full risk assessment prior to the commencement of work.

2 no. trial pits have been carried out on the site and are detailed as follows.

The topsoil in the investigation locations on the subject site was present to a maximum depth of 0.6m below ground level.

Cohesive deposits were encountered beneath the topsoil and were described as firm, light brown sandy Clay with occasional cobbles, and in the strata below that firm to stiff, brown, sandy clay with occasional greyish blue lenses of fine sand. In both trial pits the excavation was terminated at a depth of 2.40m due to the presence of boulders.

There was no groundwater strike noted in either trial pit.

In-situ CBR plate testing undertaken on site gave results ranging between 1.6% and 31% from initial readings on uncompacted ground. On reloading, the plate CBR values generally improved. In most tests CBR values were greater than 3%, therefore for the majority of the site ground improvement works will not be necessary. Localised spots may require stabilisation; however, these works do not require specialised machinery or materials and so should have

similar environmental impacts to general construction work. Please refer to construction details sheets for further information.

As boulders were encountered at substantial depths (around 2.4m) it is unlikely that prolonged periods of rock breaking will be required. However, due to the proposed basements and diversion of existing foul and surface water sewers, additional rock breaking may be required. Any rock breakers required on site will use silenced attachments to keep noise emissions low.

The ground works operation will be carried out at a manner to ensure that material removed from the ground is taken away at regular intervals in order to reduce the amount of material that can be stored on site. Excavated subsoil layers are expected to be suitable for re use as non-structural fill subject to relevant onsite testing.

Refer to Chapter 6 of the Environmental Impact Assessment Report (EIAR) - Land, Soils and Geology for further details. This can be found under a separate heading.

6.4 Material Hoisting

It is envisaged that tower cranes will be erected to hoist materials on site in the construction of apartments and/or housing units. The cranes will be designed by a specialist to free stand full height without the need to be connected to another structure.

The crane will be founded on a concrete base foundation. The size of the base will be dependent on the ground conditions encountered. It is intended that the tower crane will be erected and dismantled by a mobile crane from within the site boundary.

Careful consideration will be given to the recruitment of suitably qualified crane drivers and banksmen.

In order to control the risks associated with lifting operations beside the N6 dual-carriageway, an electronic limiting system will be fitted to the cranes. This system will prevent the crane operator from deviating from the previously agreed operating environment. At no point will load be permitted to overhang over the N6 dual-carriageway.

6.5 Waste Management Plan

A detailed waste management plan will be agreed with Westmeath County Council, prior to commencement of development upon receipt of a grant of permission, and put in place in order to improve waste management on site, increase segregation and minimise construction waste costs. Waste arising from the site will be considered in relation to the waste management hierarchy of prevention, reduce, reuse, recycle, energy recovery and disposal.

7 NOISE & VIBRATION

The construction of the project will involve the use of noise generating construction plant. There will also be an increase in noise relating to delivery of materials to site. It is intended that noise from the construction phase of the development will be kept to a minimum in accordance with:

“BS 5228: Noise Control on Construction on Open Sites”

Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2014)

Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 - Noise and Vibration

The proposed development shall comply with these documents during all phases of construction. Construction work will not be performed at night and will usually be limited to the hours indicated in the relevant planning permission.

The noise limits to be applied for the duration of the infrastructure works are those specified in the B Category of BS 5228. These limits are summarised below and will be applied at the nearest sensitive receptors to the works.

Night (23:00-07:00) = 50dB

Evening (19:00-23:00) = 60dB

Day (07:00-19:00) = 70dB

The total noise (LAeq) which should not be exceeded during daytime is therefore 70dB. Allowable Vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of;

Less than 11Hz	11 to 50 Hz	50 to 110 Hz (and above)
3mm/s	3 to 8mm/s	8 to 11mm/s

All works on site shall comply with BS 5228-2009 which gives detailed guidance on the control of noise and vibration from construction activities. In general, the contractor shall implement the following mitigation measures during the proposed infrastructure works:

Avoid unnecessary revving of engines and switch off equipment when not required.

Keep internal haul roads well maintained and avoid steep gradients.

Minimise drop height of materials.

Start-up plant sequentially rather than all together

More specifically the Contractor shall ensure that:

Regular and effective maintenance by trained personnel is carried out to reduce noise and / or vibration from plant and machinery.

The selection of construction plant with low potential for generating noise.

The siting of noisy construction plant as far from neighbouring properties as possible.

The erection of temporary barriers around items such as generators or compressors if required.

Any and all ancillary plant shall be positioned so as to cause minimal noise disturbance.

An acoustically screened area should be provided on the site specifically for noisy operations such as grinding and cutting metal.

A site representative responsible for matters relating to noise and vibration will be appointed prior to construction on site.

Hours are limited during which site activities likely to create high levels of noise and vibration are carried out.

A site representative responsible for matters relating to noise and vibration will be appointed prior to construction on site. The noise liaison officer should be appointed and charged with the responsibility of keeping people informed of progress and by setting down procedures for dealing with complaints.

A noise and vibration monitoring specialist will be appointed to periodically carry out independent monitoring of noise and vibration during random intervals and at sensitive locations for comparison with limits and background levels. It is proposed that noise and vibration levels be maintained below those outlined above as part of these infrastructure works.

All vehicles and mechanical plant used for the purpose of the Works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order. In addition, all diesel engine powered plant shall be fitted with effective air intake silencers. All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silences of the type recommended by the manufacturers, and where commercially available, dampened tools and accessories shall be used.

All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance. If operating outside the normal working week acoustic enclosures shall be provided.

Where construction activities are required in close proximity to neighbouring noise sensitive properties, a solid hoarding of approximately 2.5m in height should be erected to provide a degree of acoustic screening to the lower storeys.

Local screening should be provided for stationary plant such as generators and compressors.

Notwithstanding the above, the developer shall comply with any requirements set out in the Codes of Practice from the Drainage Division, the Roads, Streets & Traffic Department and the Noise & Air Pollution Section.

Refer to Chapter 9 of the Environmental Impact Assessment Report (EIAR) found under a separate heading.

8 SEDIMENT AND WATER POLLUTION CONTROL PLAN

All works carried out as part of these infrastructure works will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990 and the contractor will co-operate in-full with the Environmental Section of Westmeath County Council.

As part of the overall construction methodology, the following issues will be addressed and have been identified as being of particular risk and/or concern to pollution.

Contamination of Watercourse / Groundwater – There is a risk that ground water could become contaminated with lime from cement which subsequently finds its way into the local adjacent watercourses. The measures proposed to be put in place to mitigate any potential damage from the effluent of contaminated ground water would be to create an exclusion zone, as far as reasonably practicable.

Sediment & Erosion – similar to above, adjacent waterbodies/groundwater needs to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the full drainage system can be connected to the attenuation tank and outfall. A temporary positive drainage system shall be installed prior to the commencement of the construction works. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner. Alternatively, a 'siltbuster' silt control unit can be used on the outfall. The surface water will then be discharged into the below ground attenuation tank before outfalling into the public surface water network via the permanent outfall for the site. This arrangement will eliminate the need for additional works close to the site boundary and near the outfall. It will also allow surface water runoff from the construction works to be held on site within the attenuation tank should it be needed. By directing the surface water from the construction works through this temporary positive drainage system and then through the permanent attenuation tank and outfall it will ensure that:

Site disturbance is minimisation

Implement sediment control (as outlined above)

Minimise the potential for erosion

Prevent sediment-contaminated water leaving the site

Water quality monitoring – It is proposed to implement a programme for monitoring water quality at the outfall as part of the construction of this development, in agreement with the Planning Authority. This programme and locations of sampling will be agreed with Westmeath County Council

Over Ground Oil / Diesel Storage – Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent waterbodies and contained within constructed bunded areas e.g.

placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment /removal from site. Any significant storage of hydrocarbons is not envisaged as construction vehicles will be refuelled off site

Concrete Washout – The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkalinity in waterbodies. Consequently, it is a requirement that all concrete truck washout takes place back in the ready-mix depot.

Disposal of Wastewater off Site – The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner. These will be available for inspection by the Environment Section of Westmeath County Council at all times.

Road Sweepers / Cleaning – The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

Refer to Chapter 7 – Water, of the Environmental Impact Assessment Report (EIAR) under a separate heading.

9 BIODIVERSITY PROTECTION MEASURES

All site clearance and landscaping works will comply with current legislative requirements and best practice. All retained trees that are within or close to the proposed development will be protected in accordance with the requirements of British Standard BS5837:2012 'Trees in Relation to Design, Demolition and Construction' – Recommendations, with protective fencing being installed around all trees to be retained, prior to commencement of development. The planting plans and landscaping proposals will ensure that no invasive species are introduced, either deliberately or inadvertently, to the site.

Refer to Chapter 5 – Biodiversity, of the Environmental Impact Assessment Report (EIAR) under a separate heading.

10 DRAINAGE WORKS

It is proposed to construct drainage infrastructure in accordance with the plan shown on DBFL drawings 180176-DBFL-SW-SP-DR-C-1000 (& 1001).

The drainage infrastructure will be constructed and protected through the following measures:

Hoarding or fencing to be provided to cordon-off completed infrastructure works: As is standard practice on construction sites, elements of works may be completed on a phased basis. As works are completed and handed over within each phase, this area will be enclosed with hoarding or fencing offset a safe distance from the line of the existing infrastructure and no further excavation works will be allowed within this area unless agreed with site management.

Contractor to produce as-built construction records of drainage infrastructure: These records will be submitted to the engineer for approval in advance of handover. The as-built records will be reviewed and will need to be approved by the engineer before practical completion can be certified. The as-built records (drawings, manhole cards, material approvals, correspondence, etc.) will be used by site personnel as a working record of where drainage infrastructure is located and it's status. The locations of these will be recorded on the as-built and will be marked out on the ground in advance of any works commencing in later stages. This methodology will be formally incorporated into a method statement to be completed by the groundworks sub-contractor before excavations commence.

Marker tape to be provided on top of sewers running through live areas of site: As part of the methodology laying of drainage pipes, drainage works will have marker tape placed at a depth of 300mm above the pipe to warn the excavator and banksman of the service below. It is noted that the placing of marker tape over drainage lines is not a standard construction detail. However, the vulnerability of live drainage infrastructure serving a previous phase of development is noted and these measures will form part of the works.

Site personnel to be informed of works already completed: As part of the Safe System of Work Plan (SSWP), site personnel will be made aware of the drainage lines which are in operation. A site-specific method statement will be required in all cases where it is deemed that there is a risk of damaging such services. Those involved in direct management and supervision of site-based excavations require relevant competencies to deliver safety standards on site. They will have health and safety training in order to design safe systems of work that are appropriate to specific site conditions. They will need to prepare clear and simple safety method statements that can be used and understood by site workers. Ongoing checks will be carried out to ensure that appropriate equipment has been provided and is being used correctly.

Monitoring of excavation and prevention of undermining of infrastructure: Special care will be taken when digging above or close to the lines of services. The locations of these will be marked out on the ground in advance of any excavation being undertaken. In addition, careful consideration will be taken to ensure that any buildings and infrastructure serving areas outside the development site are not undermined by excavation works. The general principles outlined

in the Health and Safety Authority document: 'Code of Practice for Avoiding Danger from Underground Services' will be followed to ensure the safety of workers and to minimise the risk of damage to any existing pipelines or buildings.

Water quality control of discharges to drainage network: As detailed within the previous section, adjacent waterbodies/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. This includes preventing any sediment laden water from entering the surface water outfalls. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. Any manholes will need to be securely covered and gullies fitted with a geotextile filter to allow protection of the surface water within the pipe.

Protection of services from breakage or crushing: Where drainage infrastructure serving areas outside of the development are located within the development site, the drainage infrastructure will have to be protected from breaking or crushing. Consideration will be given to areas where heavy plant is going to be tracked across the existing drainage infrastructure. This may require construction of temporary protective concrete slabs to bridge across the existing lines where haul roads are required.

11 DUST CONTROL

It is probable that the construction activities on site will generate some dust emissions which would be in addition to any dust generated by the activities in the vicinity of the proposed development, including traffic flows. The extent of dust generation under construction activities being carried out is dependent on environmental factors such as rainfall, wind speed and wind direction.

The objective is to ensure that dust does not impact significantly at nearby receptors. Therefore, a dust management plan (DMP) will be formulated for the site upon receipt of planning permission which will address the following:

Specify a site policy on dust

Identify site management of dust

Develop documented systems for managing site practices and implementing management controls

Outline how the DMP can be assessed

Dust samples will be collected on a monthly basis as a minimum. Sampling data, results and limits (as outlined in the Environmental Protection Agency Guidelines, Environmental Management in Extractive Industry Non-Scheduled Minerals) are to be outlined and supplied to DBFL Consulting Engineers in a tabular format.

Site management

The siting of construction activities and storage piles will consider the location of sensitive receptors and prevailing wind conditions to minimise the potential dust nuisance. Site management will include the ability to respond to adverse weather conditions by either restricting operations on site or using effective control measure in a timely manner before potential for nuisance occurs.

During working hours, the site agent or another competent appointed member of staff shall monitor dust control methods;

A register shall be kept on site logging all correspondence and telephone / verbal complaints regarding construction activities outlining remedial actions if any;

A site representative responsible for matters relating to dust management will be appointed prior to construction on site. The site representative responsible for dust management shall ensure that dust management procedures are followed and ensure monitoring and assessment of same;

Dust control measures

Apply a speed limit of at least 20km/hr for on-site vehicles

Provide water bowsers during periods of dry weather to ensure unpaved areas are kept moist. Spray exposed site haul roads during dry and / or windy weather.

Ensure paved roads are kept clean and free of mud and other materials. Sweep hard surface roads, inside and outside the site, to ensure roads are kept clear of debris, soil or other material.

Restrict un-surfaced roads to essential site traffic.

Provide water bowsers during periods of high winds and dry weather conditions to ensure moisture content is high to increase the stability of the soil.

During the proposed infrastructure works the following mitigation measures shall be implemented to minimise dust emissions:

Construction techniques shall minimise dust release into the air.

Protect overburden material from exposure to wind by storing the material in sheltered regions of the site.

Regular watering of stockpiles during dry and windy periods.

Locate any stockpiles away from sensitive receptors, (i.e. receptors sensitive to dust release).

Provide tarpaulins over all unacceptable excavated materials being carted off site.

Control vehicle speeds and impose speed restrictions, (speed can mobilise dust). The wheels of all vehicles leaving the construction site will be washed to ensure that dirt and dust is not transferred onto the public roadway.

During dry spells and if deemed necessary monitoring of dust levels shall be carried out using the Bergerhoff Method i.e. analysis of dust collecting jars left on-site (German Standard VDI 2119, 1972). Results will be compared to the TA Luft guidelines (TA Luft, 1972). Should an exceedance of the TA Luft limit occur, additional mitigation measures, for example more regular spraying of water, shall be implemented.

The excavating machines will be cleaned on a daily basis to ensure no excess grease and dust is left on the machine. This will be carried out at low level below the height of the hoarding to prevent any mud coming in contact with the public.

12 CONCLUSION

The Construction and Environmental Management Plan addresses construction activities on site that may result in noise, air quality, water quality, biodiversity or waste management issues, should the plan not be put in place and implemented.

These include procedures for monitoring and tracking construction activities and ensuring construction personnel are trained and educated as necessary. The construction & environmental management plan should be reviewed as the construction phase progresses to accommodate any changes in activities on site.

This CEMP has been carried out prior to construction stage and as such will be reviewed again prior to works commencing on site and incorporated into the Contractor's Site Safety Plan and Construction Traffic Management Plan (CTMP). The contents of the site Safety Plan and in the CTMP should then be reviewed and updated as the construction phase progresses to accommodate any changes in activities on site.