

Chapter 6 Geology, Soils and Agriculture

6. Geology, Soils and Agriculture

Introduction and Methodology

- 6.1 This chapter of the statement considers the likely impact of the proposed development on Geology, Soils and Agriculture during both the construction and operational phases. As some of the details within this section are relevant to Chapter 8 (Land Quality), there is a degree of overlap between the two chapters.
- 6.2 Visits have been undertaken to the application site and surrounding area and existing published information has been reviewed through a desk study. This information has taken the form of paper maps, digital maps, databases and borehole logs. Consultation (through the PAD process) has taken place with Geological Survey of Northern Ireland (GSNI), DoE Minerals Unit and Department of Agriculture and Rural Development (DARD) Environmental Policy Division (EPD).
- 6.3 A geotechnical site investigation has been undertaken specifically for this project and the findings are utilised within this assessment.
- 6.4 In order to assess the significance of environmental impacts (after mitigation) the following criteria have been used:
- Neutral: where there will be no overall impact;
 - Slight: where impacts will be observable but where the scale of the impact is unlikely to be of material significance in the locality;
 - Moderate: where impacts could occur which will have effects on factors recognised as being of local importance or implication;
 - Substantial: where impacts could occur which have implications for factors which are of recognised regional importance;
 - Severe: where the potential impact is likely to affect a matter of recognised national or international importance, or affect a recognised national or international guideline or standard, or to be of major implication to the character or context of the area in which the feature or factor is located.
- 6.5 As part of this assessment, indirect impacts, cumulative impacts and impact interactions have also been considered.

Explanation of Baseline Conditions

- 6.6 The site of the proposed operational development is a basalt quarry. The quarry has full planning consent for mineral extraction and associated activities.
- 6.7 The operational development (MBT, EfW, RDF Baled Storage, IBA and Visitors Centre) would occupy approximately 13.37 hectares of the overall quarry site. The application site boundary

encompasses an area of 52.4 hectares which incorporates Boghill Road upgrades, Quarry access road, Construction compound areas and the Operational Facilities.

- 6.8 The quarry is currently owned by Tarmac Ltd and the extracted material has been used mainly as aggregate for road building and associated works. The material extracted from the void is primarily Basalt from the Lower Basalt Formation which is of Tertiary age. It has been used as a basalt quarry since the early 1980's. The hard rock within the quarry is overlain in areas by varying depths of overburden.
- 6.9 The quarry is made up of a number of terraces ranging from approximately 285m AOD at the highest terrace to 227m AOD at the bottom terrace. The section of the application site that will contain the operational components of the application is known as the Upper Yard and is divided by two broad benches that are cut into the rock with platform elevations of 244m AOD and 260m AOD.
- 6.10 The quarry has approximately 16million tonnes of rock remaining for which consent to extract has been granted. Approximately 5 million tonnes of rock have been extracted by Tarmac to date. Prior to Tarmac owning the quarry it was operated from 1965 by WJ Kane and it is estimated that 6.2million tonnes of rock were extracted in this period.

Geology

- 6.11 Data on the geology of Northern Ireland has been obtained from the Geological Survey of Northern Ireland (GSNI) and from documents and maps published by them. Other geotechnical information has been utilised in this assessment and is referenced accordingly. GSNI also provide links to a database which holds a wide range of geological information. This database is known as 'Geoindex' and both it and geological maps of the area present the following information to enable identification of the materials underlying the site of the proposed development and surrounding area:
- Superficial Geology (1:250,000 scale) – Glacial Till.
 - Bedrock Geology (1:250,000 scale) - Lower Basalt Formation.
 - Bedrock Aquifer: Bm(f) - High to moderate yields possible in places however dependence on fracture flow makes poorer yields possible. Potential element of regional flow, but local flow significant.
 - Bedrock Aquifer Bl(f) (located to south of application site) (above noted dyke of Palaeogene era) - Moderate yields unusual. Low yields more common. Regional flow limited. Mainly shallow, local flow.
 - Superficial Aquifer: There is a potential superficial aquifer marked alongside a relevant stretch of Boghill Road – this area may be impacted upon by widening of the road (see below for a note on the implications of the scale of the maps used). Other potential superficial aquifers are noted in the wider area, although they are outside the immediate application site.

- Groundwater Vulnerability: The BGS website describes five levels of vulnerability, with 5 being the highest and 1 being the lowest. The groundwater vulnerability rating is based on the thickness and hydraulic conductivity of the overlying deposits. In this hardrock quarry setting the superficial deposits have been removed in order to extract rock, therefore the area of the working quarry is marked as having a vulnerability of 5.

6.12 Paper based maps have also been examined and the findings are as follows:

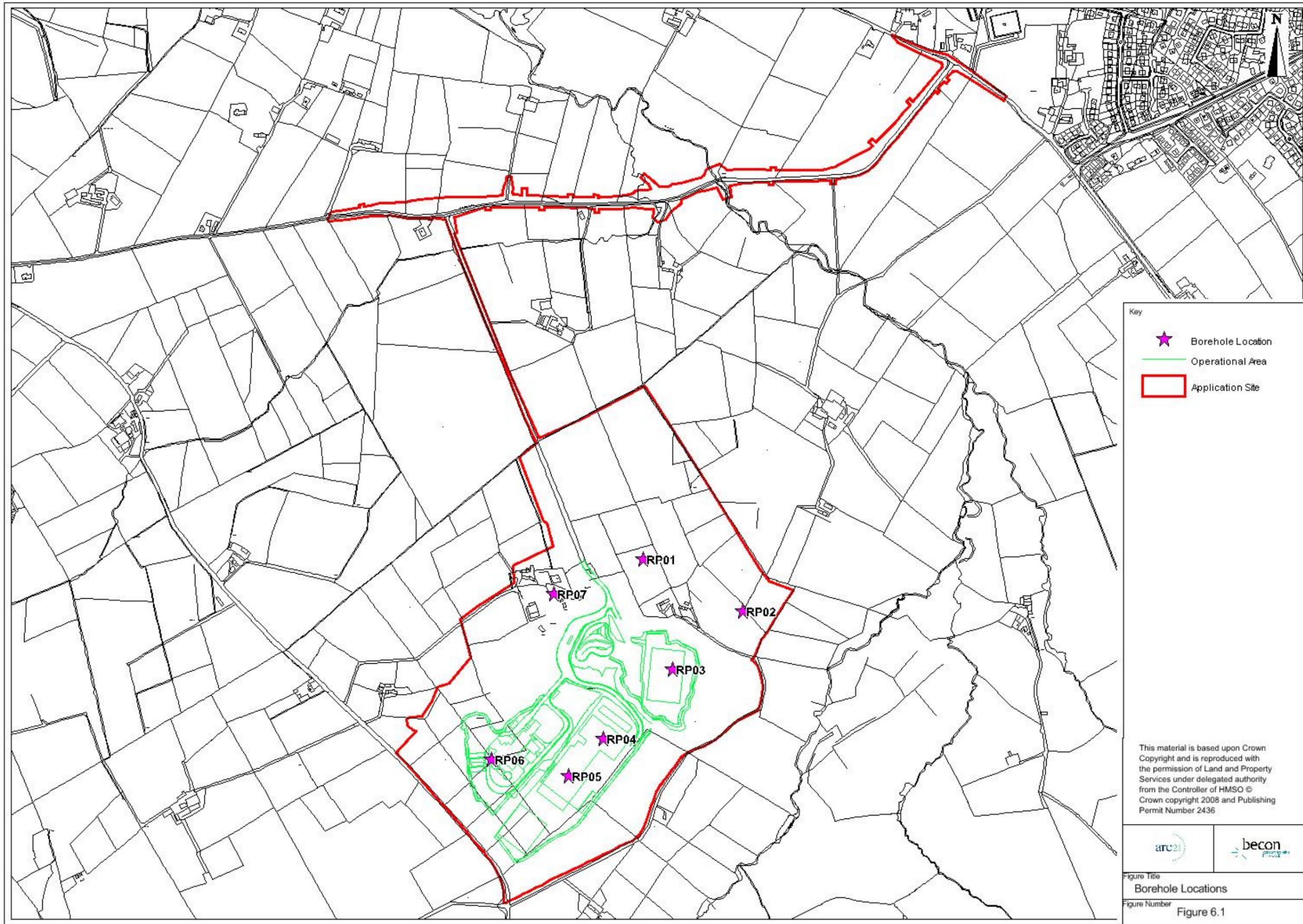
- Special Engineering Geology Sheet – Solid and Drift 1:21120 (which is the largest scale geological map for the area) shows Boulder Clay (Glacial Till) with Alluvium at two locations on Boghill Road, which are underlain by the Lower Basalt formation. Dolerite dykes trending north west to south east are shown south of the application site.
- Soil Map of the Belfast Area (DARD, Sheet 15, 1994), 1:50,000 displays soils in the area of the proposed development are marked as being poor draining Surface Water Gley overlying basalt. There are also small areas of Brown Earth in the vicinity of the Boghill Road / HydePark Road.

6.13 It should be noted that due to the small scales of the maps involved, it is difficult to capture accurately the underlying geology / hydrogeology of a particular site – especially if the site is near to a geological boundary change. An accurate model can only be created from more detailed studies, such as an intrusive investigation of a particular site.

6.14 These maps should also only be used as a ‘first pass’ assessment. For example, in relation to relative vulnerability only, to understand where groundwater is more or less vulnerable to surface or near-surface activities, where pollutants could be released. As such they can help with initial consideration of specific developments.

6.15 Information has also been obtained from the Earth Science Conservation Review. The information states that the area had historically been notable for the range/diversity of zeolite minerals present within the basalt series. Through previous developments much of this interest has been lost, however the zeolites recorded from this site are also present at many other quarries in the immediate area and elsewhere in Northern Ireland. As such the development proposal will not result in any further loss of geoconservation interest.

6.16 A geotechnical site investigation has been undertaken specifically for this project and the findings are summarised in Table 6.1. The results of this geotechnical investigation have been visually verified and the results are consistent with previous investigations that have taken place at this site. In general the (working) quarry floor is covered by a thin layer of overburden (c10-30cm) thick. Areas of made ground also exist at the site, mainly toward the north west and north east of the existing quarry working area. Borehole Logs for the most recent site investigation are located in Appendix 6.1. Locations of individual borehole positions are displayed on Figure 6.1.



arc21 Residual Waste Treatment Project: Hightown Quarry

Table 6.1 Site Investigation Findings

Borehole No.	Description	Thickness (m)	Depth (m bgl)
RP01 Ground Level: 226 mOD Water Depth Pre Purging:5.9m	Made Ground: Grey brown sandy fine to coarse gravel with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is sub-angular to sub-rounded.	0.5	0.5
	Orange-brown slightly sandy clay	1.25	1.75
	Basalt Bedrock	8.75	10.0 (end of borehole)
RP02 Ground Level: 234.97 mOD Water Depth Pre Purging:1.45m	Made Ground: Grey brown sandy fine to coarse gravel with medium cobble content. Sand is fine to coarse. Gravel is sub-angular to sub rounded.	0.5	0.5
	Basalt Bedrock	9.5	10.0 (end of borehole)
RP03 Ground Level: 233.43 mOD Water Depth Pre Purging:1.9m	Made Ground: Grey brown sandy fine to coarse gravel with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is sub angular to sub rounded.	0.3	0.3
	Basalt Bedrock	9.7	10 (end of borehole)
RP04 Ground Level: 260.18 mOD Water Depth Pre Purging:2.15m	Made Ground: Grey brown fine to coarse gravel. Gravel is angular to sub angular.	0.1	0.1
	Made Ground: Angular to sub angular coarse gravel. Cobbles and boulders of basalt with a clay matrix	1.85	1.95
	Broken and weathered basalt bedrock	0.55	2.50

Borehole No.	Description	Thickness (m)	Depth (m bgl)
	Basalt Bedrock	7.5	10 (end of borehole)
RP05 Ground Level: 261.39 mOD Water Depth Pre Purging:4.4m	Made Ground: Grey brown fine to coarse gravel. Gravel is angular to sub angular.	0.1	0.1
	Made Ground: Angular to sub-angular coarse gravel, cobbles and boulders of basalt with a clay matrix.	1.7	1.8
	Medium strong to very strong non-foliated dark grey to black crystalline fine grained basalt with close to medium spaced, planar and undulating, smooth to rough, clean and occasionally mineralised fractures. Also containing numerous calcite-filled amygdales.	3.0	4.8
	Basalt Bedrock	10.2	15.0 (end of borehole)
RP06 Ground Level: 245.31 mOD Water Depth Pre Purging:1.4m	Made ground: Grey brown fine to coarse gravel. Gravel is angular to sub-angular.	0.1	0.1
	Made Ground: Angular to sub-angular coarse gravel, cobbles and boulders of basalt with a clay matrix.	0.7	0.8
	Broken and weathered basalt	0.3	1.1
	Strong to very strong non foliated grey to black crystalline fine grained basalt with close to medium spaced, planar to undulating, smooth, clean and occasionally mineralised fractures. Also	3.2	4.3

Borehole No.	Description	Thickness (m)	Depth (m bgl)
	containing occasional calcite-filled amygdales.		
	Basalt Bedrock	5.7	10 (end of borehole)
RP07 Ground Level: 229.09 mOD Water Depth Pre Purging:227.04m	Tarmac	0.1	0.1
	Made ground: Grey brown sandy fine to coarse gravel with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is sub-angular to sub-rounded.	0.2	0.3
	Made ground: Rockfill comprising angular to sub-angular cobbles and boulders.	0.8	1.1
	Grey brown slightly sandy clay	1.2	2.3
	Weathered basalt bedrock	1.2	3.5
	Basalt Bedrock	6.5	10 (end of borehole)

Soils and Agriculture

6.17 The Soil Map of Northern Ireland (1:250,000 scale, Department of Agriculture) notes that the area surrounding the proposed development is located in an area comprising Brown Earths and Gleys.

6.18 It is also possible to utilise Historic Mapping on the Ordnance Survey of Northern Ireland (OSNI) website. The relevant maps (and the periods to which they relate) depict the following:

- Present map: Hightown Quarry;
- 1920-1951: Agricultural fields;
- 1883-1920: Agricultural fields;
- 1851-1883: Agricultural fields; and
- 1820-1851: Agricultural fields.

- 6.19 It should be recognised that some of the features noted above have been substantially altered or even removed by the operation of the quarry. The workings of the quarry have removed a number of the agricultural fields displayed on the historic mapping.
- 6.20 At present, agricultural activities are still dominant in the area surrounding the proposed development site with fields of improved and semi-improved pasture being utilised.
- 6.21 An examination of records held by DARD has shown that none of the lands under consideration are subject to the terms of a notice served relating to Potato Cyst Nematode (PCN) or Potato Wart Disease (PWD). Therefore there are no restrictions in so far as the Plant Health Order (NI) 2006 is concerned on the movement of soil or other material from these lands.
- 6.22 A desktop assessment of the area from soil maps shows that agricultural land classifications (ALC) of the proposed site range from ALC3B to ALC5 (disturbed land) which is outside the Best and Most Veratile (BMV) land classification.

Predicted Environmental Effects and their Significance (Construction)

Geology

- 6.23 In order to create the development platforms and widen out the footprint of the proposed development, it will be necessary to undertake bulk cut and fill operations. Excavated rock will be crushed on site to produce engineering grade material. Rock is likely to be cut by a combination of mechanical ripping and controlled blasting subject to the depth of material to be removed. Material will be placed as engineering fill in compacted layers. Fill material amounting to approx. 200,000m³ will be generated from on-site sources through a balanced cut and fill earthworks strategy.
- 6.24 Observations made during site reconnaissance indicate that the quarry slopes are typically globally stable with localised, but extensive, areas of potential instability including ravelling, planar, wedge and toppling type failure modes. In addition, several areas of over steepened superficial cover and highly fractured weathered rock were identified. Faces have typically been left in a state that will require some remediation with regard to the proposed end use. This is assumed to be as a consequence of the quarry method of bulk blasting.

Soils and Agriculture

- 6.25 In terms of soil there will be a temporary impact during the construction period (approximately 41 months) regarding the agricultural land to the north east of the quarry within the application site. This area will be used during the construction process for the storage of materials, plant compounds and site offices.
- 6.26 The improvements to Boghill Road will result in the permanent loss of some land utilised at present for agricultural activities. This loss of land will lead to a negligible decline in agricultural output. The area of agricultural land that will be lost is 2.77ha.

6.27 It is important to note that the construction phase will not raise any issues relating to farm severance and access to fields will be maintained at all times (or temporary access arrangements will be made in agreement with the landowner).

Predicted Environmental Effects and their Significance (Operation)

6.28 During the operation of the proposed scheme it is anticipated that there will be no impact on geology, soils and agriculture. The operation of the facility will only require the use of the development site footprint and accesses.

6.29 DARD Veterinary Service (through a consultation response) have stated that they are not aware of any animal health or welfare implications as long as the following are addressed:

- The boundary fences with surrounding fields, which contain livestock, remain stock proof during construction;
- Livestock do not have access to the materials being stored and processed;
- Materials for processing are not stored where vermin could have access to them and there is adequate vermin control on site;
- The construction and operation of these premises do not result in contamination of surrounding agricultural land/or waterways by building materials, their by-products, or leachate from the site;
- Livestock do not have access to electricity cables or other live components; and
- The proposal does not compromise any of the five essential welfare freedoms of livestock in the vicinity i.e. freedom from hunger, thirst or malnutrition, provision of shelter, freedom from injury or disease, freedom from fear, and freedom to express their normal behaviour.

6.30 The above points are all addressed throughout the operational (PPC Permit Condition and Environmental Management System) and Construction Management Plan that have been developed to fully explain the detailed operational aspects of the proposed development.

Description of Proposed Mitigation Measures (Construction)

Geology

Stabilisation Works

6.31 Mitigation procedures in relation to geology, soils and agriculture are detailed in the Construction Management Plan (CMP) which incorporates the Environmental Management Plan (EMP). A copy of the CMP is located in Appendix 3.1.

6.32 The quarry rockface has been surveyed and mitigation procedures have been prepared for stabilisation works to remove overhanging or loose materials and reposition overburden to improve the overall stability of the slopes. The stabilisation works may entail limited areas of

rock nailing and trimming as well as reprofiling by blasting. All these works will be subject to detailed analysis prior to commencement of the project construction phase.

- 6.33 A rock trench structure or a spoil bund will be constructed at the base of the quarry rockface to provide additional protection from falling rocks during the construction and operational phases of the project. The remaining spoil generated by these works will be used to complete separate level working platforms, thereby providing the formation for both the MBT and EfW facilities.
- 6.34 A range of remedial measures will be undertaken to make the quarry suitable for the proposed development. These measures will include some or all of the following processes:
- Scaling of faces with mobile plant to remove loose debris;
 - Regrading of overburden to shallower angles and introduction of a bench;
 - Rock bolting;
 - Installation of rock mesh to the surface; and
 - Stitch blasting to remove and re-grade existing surfaces.
- 6.35 The extent and use of each technique will be determined and undertaken by specialist contractor and will be informed by a detailed slope stability assessment. For the purposes of this EIA it is assumed that all of the above construction techniques will be employed.
- 6.36 The construction work that will yield net surplus excavation material are for example:
- The EfW bunker;
 - Foundation preparation;
 - Clearance cuts for the conveyors from the MBT facility to the EfW facility; and
 - Edges from the cliff faces.
- 6.37 Fill material amounting to approx. 200,000m³ will be generated from on-site sources through a balanced cut and fill earthworks strategy.
- 6.38 The “consumers” of the surplus material will be:
- Bunds;
 - Voids for building platforms; and
 - Road fill.
- 6.39 To achieve this, a mass balance calculation will be carried out that takes the above factors into account. For the execution of this strategy, areas have been identified at the Hightown Quarry site for temporary storage of the raw material as well as the location of a rock breaker, a sieve and sorted materials storage piles.

- 6.40 DoE Minerals Unit have advised that any civil engineering works requiring blasting /explosives must comply with current Health and Safety legislation (including Quarry (Explosives) Regulations (Northern Ireland) 2006. Prior to any blasting / explosions the contractor will contact the Health and Safety Executive (HSENI) for advice.
- 6.41 HSENI will also be contacted regarding proposals for the final faces of the quarry affecting the application site so that the safety of the proposed development and adjacent areas are not compromised. The contractor will contact HSENI prior to any enabling works taking place.
- 6.42 In order to eliminate hazards and reduce foreseeable risks, as far as is reasonably practicable the project designers will provide information for the safety file that will ensure that any workplace they design complies with the Workplace (Health, Safety and Welfare) Regulations 1992. The designer will take all reasonable steps to provide with his design sufficient information about aspects of the design of the structure to allow for a safe system to be developed for any future alterations or demolition of the structure.
- 6.43 Upon the completion of the operational life of the facility the buildings will be made available for refurbishment, decommissioning or demolition.
- 6.44 The design has been developed to allow for this requirement. As-built drawings, design statements, services layouts and Control of Substances Hazardous to Health (COSHH) information for materials used will be enclosed in the Health & Safety file to be retained by the operator. This will allow detailed risk assessments and method statements to be prepared for future works.
- 6.45 In the event that the demolition of the buildings is selected the following considerations will apply in the formulation of method statements:
- Steel Framed Structures which are standard portal frames will have no special considerations with regard to sequence of demolition;
 - Concrete framed structures are standard construction with no special considerations with regard to demolition;
 - Steel framed structures to the EfW Facility will interface with the installed equipment and the demolition will refer to the erection statement included with the Health and Safety File; and
 - An assessment of the waste records is recommended to determine the nature of any matters which may influence the demolition process.
- 6.46 As part of the Pollution Prevention and Control (PPC) licensing process a site closure plan will be developed, maintained and routinely updated to demonstrate that the installation can be decommissioned to avoid any pollution risk and return the site of operation to a satisfactory state. The site would then be available for future quarrying and / or quarry restoration.

6.47 The application site will be protected by perimeter fencing during the site enabling works. Any agricultural field boundary that may require removal will be reinstated so as to remain stock proof. This is an issue that is restricted to Boghill Road widening works. Livestock will not have any access to materials on site or have any access to electricity cables or other live components. The proposals will not compromise the welfare of livestock.

Foundations/Substructure

6.48 There are three main distinct levels in the southern void on the site. The proposed MBT facility and RDF Baled Storage building are located on the upper plateau and the EfW facility is located on the lower plateau, The Visitors Centre and Incinerator Bottom Ash (IBA) storage plant are located east of the lower plateau on a slightly raised elevation.

6.49 The major upper plateau structures have been positioned so that a rock bearing solution can be adopted, minimising cut/fill quantities and eliminating the need for piling. For example, some of the smaller structures may utilise a raft foundation solution on engineered fill to rock level.

6.50 The foundations consist of reinforced concrete construction designed to BS EN 1992 incorporating the relevant conveyor trenches, sumps and drainage channels within the substructure. Localised loading from internal machinery, masonry walls and the steelwork superstructure are accommodated within the design parameters.

6.51 The reinforced concrete design incorporates the following general points:

- All elements in connection with the process/plant operation have been designed to BS EN 1992;
- Walls and slabs have been designed to accommodate the various lateral and vertical superstructure loadings; and
- Thermal and shrinkage movements (consistent with required structural adequacy) are minimised within the concrete design and are controlled by the use of appropriate construction sequencing.

6.52 The various buildings / structures that form the facility require a variety of foundation designs as follows:

- The foundation for the concrete cast bunker, operations building, staircase and switchgear building are reinforced concrete slabs;
- The boiler house and the flue gas cleaning, being structural steel buildings, will have adapted concrete bases that take account of the loads from each component in the building; and
- The foundation for the bottom ash treatment and storage facilities must provide a gradient to allow the wet bottom ash to dry and to contain effluents from the bottom ash. This necessitates a requirement for a watertight concrete slab.

Soils and Agriculture

- 6.53 In terms of soil and agriculture, the areas used for temporary construction purposes will be reinstated to a similar condition of the pre-construction state. Particular care will be paid to the disposal of spoil from excavations. This will not be placed on farmland without the prior permission from the relevant government organisations i.e. DoE and DARD. Spoil will not be disposed of on valuable habitat areas.
- 6.54 The improvements to Boghill Road will also result in the loss of some land utilised at present for agricultural activities. The area of agricultural land that will be lost is 2.77ha. It is anticipated that the loss of this land will lead to a negligible decline in agricultural output.
- 6.55 Scrub, hedge or tree removal associated with the development will not take place between 01st March and 31st August unless agreed by the Department. In that event any proposed removal would be preceded by a survey conducted by a qualified ecologist. Please refer to Chapter 9 for more information relating to ecological issues.
- 6.56 If any areas are temporarily stripped of soil to allow construction activities to take place (e.g. to provide temporary access to fields), then topsoil will be stored in an appropriate place (i.e. away from watercourses) and remain separated from subsoil. The topsoil and subsoil will then be replaced in the appropriate area and all field drains will be reinstated. Details of hedgerow removal and new planting are dealt with in Chapter 10 (Landscape and Visual Impact).
- 6.57 The construction phase will not lead to any issues of farm severance and access to fields will be maintained at all times (or temporary access arrangements made in agreement with the landowner). No further mitigation measures are suggested in relation to access to agricultural property.

Description of Proposed Mitigation Measures (Operation)

Geology

- 6.58 Bunds have been introduced at the toe of quarry faces to act as rock trenches. As part of the operation of the facility the quarry faces will be subject to routine periodic inspection.
- 6.59 There will not be any impact on the geology, soils and agriculture of the area during the operational phase of the scheme. DARD Environmental Policy Division (Veterinary Branch and Countryside management) have stated through consultation that it is unlikely that the plant will require approval under the Animal By Products Regulations (ABPR) and the proposal should not have a detrimental effect on veterinary or public health provided relevant legislation is adhered to. It should be noted that the operation of the facility will be licensed under the PPC Regulations. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. It also means that the enforcing authority (NIEA) must set permit conditions to achieve a high level of protection for the environment as a whole.

Soils and Agriculture

- 6.60 As noted above, DARD Veterinary Service has stated that they are not aware of any animal health or welfare implications as long as certain issues are addressed. In order to ensure this is the case, stock proof fencing will be erected around the site at the beginning of the construction phase. Appropriate fencing will be maintained throughout the construction phase and during the operational phase. This will ensure that livestock does not have access to the facilities or any material contained within.
- 6.61 Similarly all cabling or other live components will be underground or contained within infrastructure to which livestock cannot gain access.
- 6.62 Mitigation to ensure that construction and operation of these premises do not result in contamination of surrounding agricultural land/or waterways by building materials, their by-products, or leachate from the site is explained in the following Chapter (Chapter 7, The Water Environment) and Chapter 14 (Air Quality).
- 6.63 No mitigation is suggested in relation to the five essential welfare freedoms of livestock as it is considered that the proposed development will not impact on these.

Description of residual Effects and their Significance taking Mitigation into account (Construction and Operational)

- 6.64 The proposed development will not preclude further mineral extraction from the quarry site post decommissioning of the proposed plant. The construction of the development will involve re-grading of the quarry shelves, but in comparison to the amount of rock that may be extracted from a fully functioning and permitted quarrying operation; the impact on geology is considered to be neutral.
- 6.65 Temporary disturbance to some soil and agricultural land will occur as a result of construction activities. All areas impacted by these temporary construction activities will be re-instated to their pre-construction condition. While there will be permanent loss of small areas of agricultural land the impact on soils and agriculture is considered to be slight adverse.
- 6.66 Landowners will be consulted with regard to their participation in agri-environment schemes, including the NI Countryside Management Scheme. If any of the landowners, or lessee, hold management agreements under such schemes DARD will be notified prior to any development.
- 6.67 There will not be any detrimental impact on animal health due to the proposed scheme.
- 6.68 Some agricultural land (2.77ha) will be required due to upgrade requirements of the Boghill Road and while this will lead to a reduction in agricultural output it is considered that this will be negligible. The proposed development will not result in any agricultural severance.
- 6.69 In terms of indirect impacts it is considered that impacts on geology, soils and agriculture could have potential indirect impacts on ecology, landscape and population. These impacts relate directly to the construction processes which will result in the removal of rock and soil from the

site and implications of the operation of the proposed facility and are considered within the assessments of ecology, landscape and population contained within this ES.

- 6.70 Impact interactions are the impacts of the various stages of the project i.e. the construction and operational stages. It is considered that with the implementation of the appropriate mitigation as outlined above no impact interactions during the construction and operational stages will occur.
- 6.71 Cumulative Impacts are impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project under consideration. Recent past and present activities on the site have involved quarrying operations. Past quarrying operations have resulted in the extraction of approximately 11.2 million tonnes of rock. Approximately 200,000 m³ of rock will require excavation to facilitate the proposed development, however in comparison to a continuing quarry operation at this site the rock removal will be very small. Continued quarrying operation could result in the removal of circa 16 million tonnes of material. It is therefore considered that there will be no cumulative effect as quarrying activities will cease for the operational life of the development.