

9. Dust Assessment

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Introduction

- 9.1 The significance and resultant impacts of dust emissions from any development are dependant upon the amount of dust created, the proximity of dust sensitive locations to the sources of dust created, and the prevailing meteorological conditions for that location.
- 9.2 By its nature the extraction and processing of primary minerals and the processing of inert waste for recycled aggregate can give rise to dust emissions. This report assesses the impact of the proposed operations on surrounding properties, their inhabitants and land uses and suggests appropriate mitigation measures which should be put in place in order to ensure that the working of the site does not give rise to nuisance.

Proposal

- 9.3 This application is for the winning and working of sand and gravel from 72 hectares of land north east of Cottenham bordered by Twenty Pence Road to the west the River Ouse to the north and Long Drove to the east. The proposed extraction area is allocated in the Cambridgeshire and Peterborough Minerals and Waste Development Plan Site Specific Proposals Development Plan Document (Site M1A – Cottenham).
- 9.4 The site contains some 1.7 million tonnes of workable sand and gravel. It is proposed that mineral extraction would be worked at around 140,000 tonnes per annum over a 12 year period. Extracted sand and gravel would be transported by dumper to new processing plant area for processing. Processed mineral would be exported via the existing internal haul road within the Waste Management Park to join the A10 via the existing roundabout junction. Mineral extraction in the proposal site would be commence on completion of the existing Gravel Diggers workings.
- 9.5 As part of this application it is proposed to import 1 million cubic metres of inert material, which equates to around 120,000 tonnes per annum, for restoration purposes to allow the progressive restoration of a large part of the excavated area to a state fit for an agricultural afteruse over a 15 year period. The proposed restoration profile for this area is a gentle dome rising up to a level 3 metres above surrounding ground levels. The northern area of extraction will be restored to a low level wet grassland. As part of the proposed development an inert material recycling facility together with the mineral stockpile area would be established alongside the proposed processing plant. The recycling facility will recover recyclable materials during the period of infilling operations. It is anticipated that the recycling plant will recover around 30,000 tonnes per annum of saleable material.
- 9.6 It is estimated on average the proposed development will generate around 80 movements per day. No increase is anticipated regarding the movement of aggregates however the movements represents an increase of 13 on the

current 67 quarry movements as a result of the need to import inert material for restoration purposes.

- 9.7 The proposed location of the plant site, bunding and phased working is shown on drawing CP/FRIM/MH/03 included as Appendix A.

National Guidance

- 9.8 The National Planning Policy Framework makes it clear that unavoidable dust emissions are controlled, mitigated or removed at source. The Technical Guidance to the National Planning Policy Framework provides advice dust assessment studies to ensure dust from mineral workings is controlled and mitigated.

Potential sources of dust emissions

- 9.9 Dust particles are typically 1 –75 µm (micrometers) in diameter. Their dispersal is affected by the size of the particles emitted, and wind speed as well as their shape and density. The greatest proportion of dust emitted from mineral workings, typically are large dust particles (> 30 µm) and will largely be deposited within 100m of the source. The potential for dust varies with mineral types, with softer mineral such as chalk and coal, which crumble more easily during handling, producing more dust. Weather conditions, including wind, precipitation and temperature, will also influence the generation of dust.

- 9.10 The amount of dust generated and emitted from a mineral working and the impact on the surrounding area varies with respect to the following factors:

- the types and quantity of mineral and the method of working;
- the types of processing activities undertaken on a site;
- the character and land use of the area surrounding the site;
- the hydrogeology of the site and the vegetation cover; and
- climate/local meteorology and topography.

- 9.11 There is potential for dust from the following proposed operations:

- **Soil stripping and replacement**

- 9.12 The handling of soils is generally carried out in dry weather conditions in accordance with government guidance for the protection of soils and therefore may have a significant potential for dust generation. However, soil has a relatively high moisture content and in this case soils are likely to remain damp throughout the year. Soil removal and subsequent replacement takes only a matter of weeks particularly as the surface area of each phase is relatively small. The operations would be undertaken using a 360° tracked excavator and the material transported to the appropriate area by dump trucks. In particularly dry weather conditions the use of water sprays on the stripping area and the intervening haul road would reduce the potential for dust emissions from these areas if required.

9.13 The sensible timing of these operations and good management in relation to weather conditions would ensure dust emissions are kept to a minimum.

- **Bund formation**

9.14 The above comments also apply when stripping soils to form storage bunds. The outer layers of the bunds quickly form into a crust which subsequently acts to seal the underlying material. Any soil bunds would be grass seeded which, during the right weather conditions and appropriate season, can develop a significant sward within a few weeks. This is highly effective in controlling dust emissions.

- **Haulage**

9.15 The weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of surfaces or haul routes all affect the amount of dust emitted. The main potential source of dust emissions would be the movement of wheeled plant, including HGVs crossing the site and using unsealed haul routes.

9.16 The most effective way of reducing dust emissions is by watering roads and circulation areas. The loose material on unsurfaced roads is an important source of dust from wind blow or from the passage of vehicles. Regular grading of the roads also aids to reduce dust emissions by removing loose material from the surface. The design, layout and maintenance of these roads are important methods of dust control. The location of the haul road and the restriction of vehicles speed also reduces the amount of dust emitted. The access road to the plant site is screened by bunds and tree planting. To minimise dust a site speed limit of 10 mph should be enforced.

- **Excavation and processing**

9.17 The process of extracting sand and gravel does not tend to give rise to dust emissions as it is damp when worked, the potential for dust emissions from extraction operations is negligible. The processing of the mineral would be carried out using a washing and grading plant. Due to the washing element the mineral would be wet throughout the processing operation and would not give rise to dust emissions.

- **Materials stockpiling and loading**

9.18 Materials stockpiles may also be a potential source of dust emissions. Fine sand stockpiles may be subject to wind blow. The proposed stocking area lies adjacent to the plant site situated at the southern end of the site and lies at a lower level (minimum 1 metre below surrounding land). The plant site is surrounded on all sides by screening bunds at a minimum of 3 metres in height. Along the southern, eastern and western, side closest to the nearest residential properties, there are also sub soil bunds some 5 metres in height. The site is also sheltered on its by existing boundary vegetation

along the eastern and southern boundaries of the site near to the plant site. Therefore, any material that becomes windblown would be contained within the area of the processing plant. The limitation of stockpile heights would also minimise the risk of wind blow outside the plant area. Stockpiles would be sprayed with water if necessary to reduce the risk of wind blown dust.

9.19 The loading of the materials into the back of HGVs may also result in wind blow of fine materials. This can be limited by reducing the drop height between the loading equipment and lorries. In addition, it can be controlled by siting loading activities in more sheltered locations. The loading of lorries would be carried out in the plant site area which is screened as described above. The loading of dumpers would primarily take place in the base of the excavation and so would similarly be sheltered.

- **Screening**

9.20 Inert material will be sorted into soils for screening for restoration and any hardcore and rubble for crushing. The screening of soils in dry windy conditions can result in significant dust emissions. In order to control emissions, the siting of the operations and good management in relation to sensible timing of operations with regard to weather conditions is essential. The material can be watered if necessary but such operations should not be carried out in particularly dry and windy conditions which may give rise to unacceptable dust emissions. The screening operations will be restricted to the plant site, the level of which will be at approximately 1 metre below surrounding ground levels and screened by bunds to control any dust arising from the operations.

- **Concrete Crushing**

9.21 Without mitigation any concrete crushing operations have the potential to be a significant source of dust emission. The crushing of inert materials such as bricks and concrete require a Permit to operate. This requires all crushers to be fitted with water sprays, the discharge from crushers to be enclosed as far as possible and the ends of the final discharge to be hooded and fitted with water suppression. Other mitigation measures include minimising the drop heights from the crusher to the stockpiles. When a stockpile of hardcore material has been recovered the material will be crushed using the onsite crusher. The crusher is authorised and is maintained regularly to ensure effective working at all times. Crushing operations only take place during short periods when stockpiles material would be processed.

9.22 The concrete crushing operations will only take place within the plant site, the level of which will be at approximately one metre below surrounding ground levels and screened by bunds to control any dust arising from the operations.

Meteorological Conditions

Wind Speed and Direction

- 9.23 The direction of wind and its speed are usually the most important factor which will affect dust emissions. The nearest known meteorological station to the site is at Wyton Airfield which is some 19 kilometres west of the site. The wind in this area is predominately from the south west quadrant and for approximately 85% of the time it is less than 8.2 ms⁻¹.

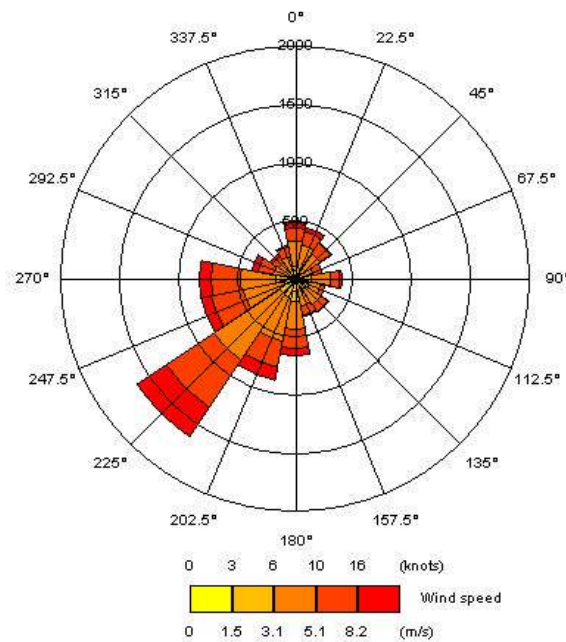


Figure 1 Windrose for the MetOffice Station at Wyton

Rainfall Data

- 9.24 Average rainfall data obtained from the Environment Agency for the Stretham rain gauge, (Station ID 180704) located 3.5 km to the northeast of the site boundary at NGR TL 51600 72900. Average annual rainfall for the period 1971 to 2000 was 541.9 mm/a. The full data is provided in Chapter 7 of the Environmental Statement on Hydrology.

- 9.25 This confirms that it is a relatively dry area and that dust emissions may be a problem if not addressed by good working practices.

Potential Impacts

Amenity

- 9.26 Dust emissions have the potential to have a number of nuisance effects ranging from visual impacts such as dust plumes generated by the movement of vehicles, to physical impacts causing discomfort, to the depositing of dust on windows, on the outside of houses and on cars. These effects are typically associated with coarse dust which is visible.

Health

- 9.27 Particulate air pollution is associated with a range of effects on health (from particles less than 10um in diameter, known as PM₁₀) including effects on the respiratory and cardiovascular systems, asthma and mortality. Quarry work can produce airborne respirable crystalline silica (RCS). All RCS is hazardous, causing silicosis. This is a serious lung disease causing permanent disability and early death. Respirable' means that the dust can get to the deepest parts of the lung.
- 9.28 In everyday life all of us are exposed to low ambient levels of RCS. With adequate controls dust can be controlled and although there are relatively few studies on the effect of particulate air pollution around quarries there are not thought to be any substantiated claims that health has been affected around working quarries. In view of the limited size and controls of the extraction any health risks associated with dust emissions are negligible.
- 9.29 Around the plant site there is greater potential for higher concentrations of particulate matter. The site is not open to the public and the plant site is screened by bunds some 5 metres high. Furthermore, the prevailing wind direction to the north east is away from the nearest current residential properties some 70 metres from the working area to the south. Details on the location of the nearest properties in relation to the working is provided below. The Health & Safety Executive regulate the occupational workplace exposure limits for staff at the site who would be the primary parties likely to be exposed to high level of dust likely to cause health issues.

Ecology

- 9.30 In sufficient quantities there is the potential for dust to have physical effects on plants by coating leaves and therefore in effect reducing the light available to the plant for photosynthesis. However, the chemical effects of dust, either directly on the plant surface or on the soil, are likely to be more important than any physical effects. Given the nature of the mineral to be worked and the location of sites of ecological interest it is unlikely that there will be any significant impacts on ecology arising from dust emissions. Details of the nearest sites are provided below.

Dust Sensitive Locations

- 9.31 There are no high dust sensitive uses (such as hospitals hi-tech industries and food processing) identified in the Technical Guidance to the National Planning Policy Framework in close proximity of the site. There are a limited number of medium sensitive uses (which include residential and ecological) within 200 metres of the site.

Residential

- 9.32 The site lies within open countryside the predominant use of which is arable farmland. The nearest part of the site to residential properties is situated to the south and south east corner of the site. These properties are The Farmhouse, Elm Farm, Gravel Diggers Farm and Chestnut Farm.

Off Long Drove – South/Southeast of the site

- 9.33 The nearest property to the site's southern boundary is The Farmhouse which is situated 15 metres from the application boundary. There is a standoff proposed from this property with the nearest bunds situated some 70 metres away and with the nearest extraction proposed over 200 metres. The Plant Site is situated some 300metres from the property. Gravel Diggers Farm is 43 metres from the application boundary, 104 metres to the nearest bund, 230 metres from the extraction area and 340 metres to the Plant Site. Elm Farm is 55 metres from the application boundary, 106 metres to the nearest bund, 240 metres from the extraction area and 344 metres to the Plant Site. Chestnut Farm is 45 metres from the application boundary which is the current access road into the existing permitted quarry, 200 metres to the nearest bund, 297 metres from the extraction area and 380 metres to the Plant Site. The current processing plant at Gravel Diggers east of the application area is some 195 metres from Chestnut Farm with the nearest bund 35 metres from the property.

Off Twenty Pence Road - west/northwest of the site

- 9.34 To the west and south west of the site is also predominantly arable farmland. A number of scattered houses and farms front Twenty Pence Road, the nearest are Micel Leah Cottage, Napoleon Farm and Hawthorn Farm. These properties are 480 – 530 metres from the application boundary and over 850 metres from the plant site. The nearest properties to the northwest includes a collection of houses known as The Lakes lying 116 metres from the western boundary on the opposite of Twenty Pence Road and some 123 metres to the nearest bund. The plant site lies over 650 metres to the south east. To the north of this main collection of properties is a former agricultural building with permission to convert to a residential property. This property is 25 metres from the application boundary and 64 metres to the nearest bund.
- 9.35 Further north along Twenty Pence Road to the north west corner of the site along the River Great Ouse is Twenty Pence Cottage, situated some 125

metres from the site boundary and 850 metres from the plant site. There is also a collection of houses associated with the redevelopment of the Old Twentypence Inn which are some 165 metres from the site boundary. These properties are adjacent to the Twenty Pence Marina 190 metres away.

Mitchell Hill Farm

- 9.36 Mitchell Hill Farm is an isolated farmstead some 312 metres south west of the site with access off Twenty Pence Road. The dwelling is some 630 metres from the Plant Site.
- 9.37 There are no near residential properties to the east/north east of the application site.

Potential impact and mitigation

- 9.38 The prevailing wind is from the south west quadrant. Dust emissions will vary depending on weather conditions and the particular activities being undertaken. With south westerly winds accounting for the majority of wind direction any dust emissions would be taken away from the nearest properties and in to open farmland. There are no existing residential properties in this direction from the proposed quarry extension for over 1km. The nearest properties which potentially could be considered to be at most at risk of being affected by dust emissions without mitigation measures being undertaken are located nearest the Plant Site and main circulation areas, these are The Farmhouse, Gravel Diggers Farm and Elm Farm however they are all situated over 200 metres from the proposed extraction and 300 metres from the Plant Site. Substantial screening bunds are proposed in an arc to screen these properties from the proposed workings and standoffs are maintained. The standoff from the current extraction at Gravel Diggers to the east of the application area is 115 metres. This proposed extension increases the standoff to 207 metres. There have been no known complaints associated with the current workings regarding dust emissions. The proposals move working further away from Chestnut Farm although the access route to the site will remain. The access route nearest Chestnut Farm is currently screened by planting and a 3 metre high acoustic fence.
- 9.39 The properties closest to the application site to the northwest is where ground water levels are at their highest and where the material will be damp when worked. All properties along Twenty Pence Road will be screened from the site by advance hedge planting and a 5 metre high bund.
- 9.40 The Plant Site where there is more potential for the operations to give rise to dust emissions and it is enclosed by proposed bunds of up to 5 metres high, this together with the existing planting along Long Drove east of the plant site will help to ensure any dust emissions arising from the operations are contained within the quarry area. Dust suppression measures and good

working practices, will ensure there will be no nuisance from dust emissions for neighbouring properties.

Ecological

- 9.41 There are no areas identified or protected for their ecological interest which are considered to be likely to be significantly affected by dust emissions.
- 9.42 The nearest sites are designated County Wildlife Sites (CWS); these are Engine Drain which runs horizontally across the site splitting the southern and northern parts of the working, a historic quarry site, Twenty Pence Lakes, to the west of Twenty Pence Road which was dug many years ago and has naturally regenerated and the River Great Ouse to the north of the application site. Although close to the working areas as the mineral will be damp when worked and the sites are primarily to the west and north of the application area and not in the direction of the prevailing wind they will not be affected by dust emissions. There is a 55 metres standoff from The River Great Ouse CWS and a 9 metre standoff from Engine Drain CWS. The greatest potential for dust impact will be associated with the movement of vehicles and plant. With the good working practices observed at all times any potential for dust emissions to travel outside the plant site and working areas will be minimal.

Others

- 9.43 Although less sensitive than residential, dust emissions have the potential to affect users of nearby footpaths. Such potential impacts would be short in duration and would be variable depending upon factors such as proximity and depth of working areas however without mitigation measures in place dust emissions would have the potential to be an uncomfortable experience for footpath users.
- 9.44 The nearest footpaths to the proposed site run along the river bank to the north of the extraction area and there is also a public footpath along Engine Drain which runs from the corner of the site which splits the northern and southern sections, eastwards and then south to the Fruit Farm on the A10. In this northern section of the site the mineral will be worked damp and there is no processing proposed in this area therefore users the footpaths of will not be affected by dust emissions from the proposed workings.
- 9.45 To the east of the proposed site there are a group of farm buildings known as Chear Fen Farm which form the Cambridge Gun Club. The boundary of the Gun Club is some 220 metres from the application boundary and it is screened by substantial bunding in excess of 6 metres high it therefore will not be affected by dust from the proposed operations.

Dust Control Measures

- 9.46 The key principle is that dust emissions should, as far as possible, be controlled, mitigated or removed at source. It is possible to provide

mitigation measures in respect of each potential dust source arising on site by design and good management practices.

- 9.47 The construction of the bunds and soil stripping would not be carried out in unfavourable conditions i.e. strong winds blowing in the direction of residential properties. The duration of these operations are limited and in general of no more significance than normal agricultural activities.
- 9.48 The area where is the greatest potential for dust emissions is the passage of plant and lorries across the site, to control these dust emissions a water bowser would be used to dampen down circulation areas when required. In addition, the speed of vehicles would be restricted.
- 9.49 The crossing points across the public highways into the site are constructed with a sealed surface. These will be kept clean to minimise any dust emissions.
- 9.50 The process of extracting sand and gravel does not tend to give rise to dust emissions as it is damp when worked.
- 9.51 Any machinery would be fitted with appropriate dust suppression equipment. With regard to the recycling of inert materials, any crusher would have the necessary Permit to ensure the required standards are met.
- 9.52 The following practices would be employed to minimise dust emissions:
- All vehicles carrying materials with a potential to create dust would be sheeted.
 - Internal haul routes would be constructed and maintained to minimise dust.
 - Roads and circulation areas would be damped down in periods of dry weather by spraying water.
 - Vehicle speeds would be restricted to a maximum of 10 mph.
 - All vehicles, plant and machinery would be operated and maintained in accordance with manufacturers specifications.
 - Stockpile heights would be limited to 5 metres.
 - Stripping and replacement of soils would be carried out in the appropriate seasons and weather conditions.
 - All plant based on the site would be equipped with upward facing exhausts

Conclusions

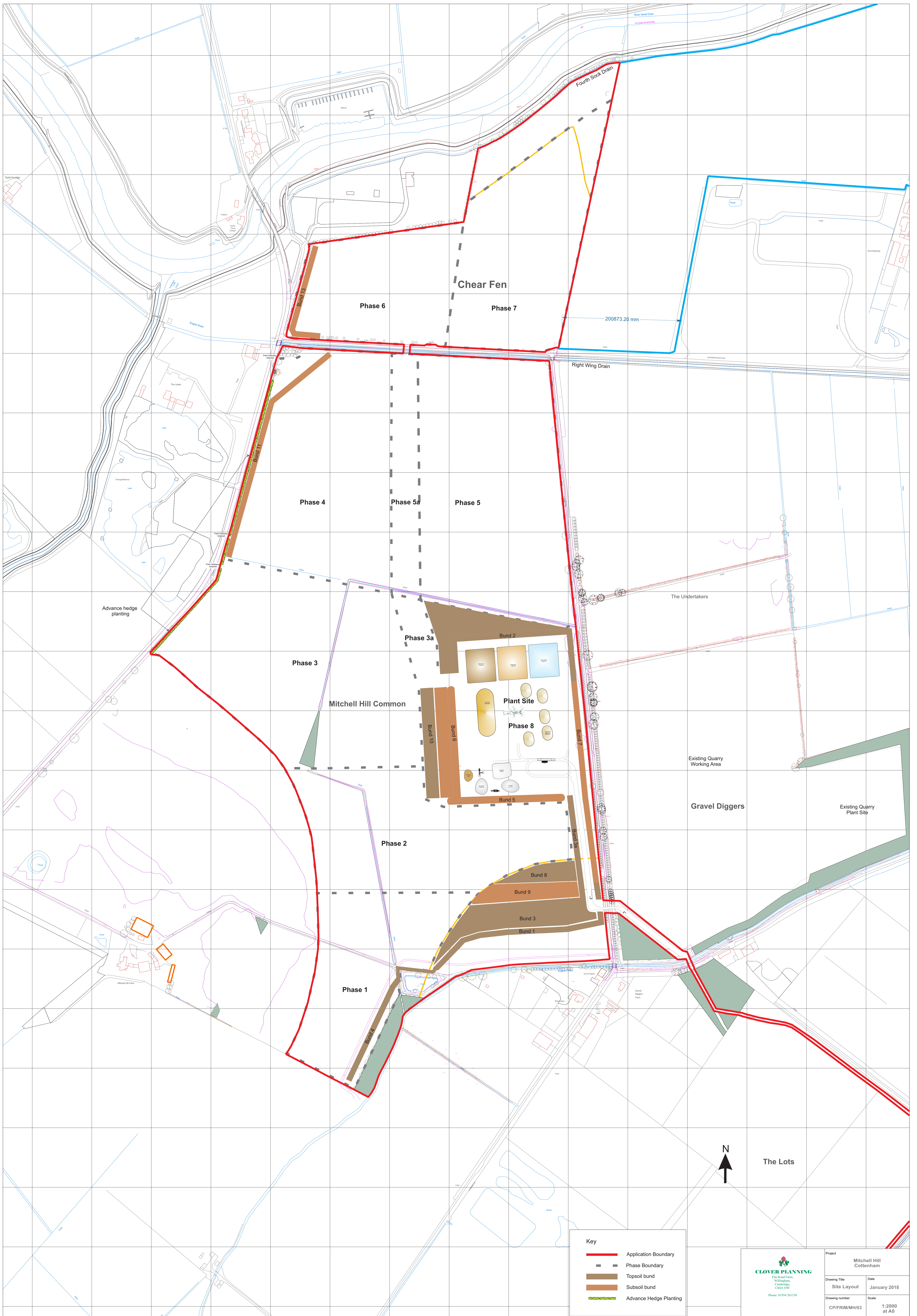
- 9.53 Most of the dust emissions which would arise from site operations would be of a relatively large particle size which would generally be deposited close to the emission sources.
- 9.54 The significant separation distances between the nearest residential properties and the processing plant site reduce the risk of potential dust

emissions. The location of the plant site at a lower level (some 1 metres below) and screening bunds will ensure that operations which may give rise to dust emissions can be controlled within the working area. The provision of appropriate screening bunds and boundary planting will reduce the risk of dust emissions causing a nuisance and with the proposed mitigation measures in place potential dust impacts would be negligible.

- 9.55 The adoption of good working practices and appropriate dust control measures would ensure any dust emissions are adequately controlled within the site.
- 9.56 It is considered that the dust emissions from the proposed development would be kept to a minimum and that no dust nuisance would arise.

Appendix A

Drawing Number: CP/FRIM/MH/03



Key

	Application Boundary
	Phase Boundary
	Topsail bund
	Subsoil bund
	Advance Hedge Planting

CLOVER PLANNING
 The Road Farm,
 Willingham,
 Cambridgeshire,
 CB23 5TW
 Phone: 01954 261538

Project	Mitchell Hill Cottenham
Drawing Title	Site Layout
Date	January 2018
Drawing number	CP/FRIM/MH/03
Scale	1:2000 at A0