Wivenhoe Quarry

Environmental Risk Assessment

Tarmac Trading Limited

Report No. K6008-ENV-R003
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Revision 01

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Contents

1 Introduction

1.1 Report Objectives

This Environmental Risk Assessment (ERA) has been produced to support a bespoke permit application for a recovery activity which will be operated by Tarmac Trading Limited (the Operator) to restore the "land to the south of Colchester Main Road (known as Sunnymead, Elmstead and Heath Farms), Arlesford, Essex, CO7 8DB" (the Site) as required by Planning Permission ESS/17/18TEN. Planning Permission ref ESS/17/18/TEN has been granted by Essex County Council on 18th December 2020 for the extraction of sand and gravel as an eastern extension to the existing Wivenhoe Quarry, followed by restoration to agriculture and low-level water-based nature conservation habitats, lowland meadow, woodland planting and hedgerow enhancement.

Reference has been made to Environment Agency web-based guidance[1] to assess the potential risks associated with the proposed activity. The guidance referenced identifies the following step process to risk assessments which can be summarised as:

- Identify risks;
- Identify receptors;
- Identify possible pathways;
- Assess relevant risks; and
- Control risks.

The guidance indicates that the following parameters require assessing:

- Any discharge;
- Accidents;
- Odour;
- Noise and vibration;
- Fugitive emissions (such as dusts, litter, and pests);
- Visible emissions; and
- Release of bioaerosols.

The guidance requires that receptors are considered with regard to the proximity of the site. Table 1, of this report identifies the most likely sensitive receptors adjacent to site and has been compiled using information available through internet-based searches.

[1] Risk assessments for your environmental permit - GOV.UK (www.gov.uk)

1.2 Assessment of Environmental Risk

The guidance requires that everyone applying for a new environmental permit (other than a standard rules permit) or variation to an existing permit should present information in the form of risk assessment tables, one table for each actual or possible hazard identified. Identification of accident scenarios and their prevention through operational management should also be detailed. Each table should identify the hazard, the process that causes the hazard, the potential receptors and the pathway from the hazard to those receptors. In addition, the tables should also include the preventative risk management practices to be employed along with an assessment of the mitigated risk.

2 Scope of the Assessment

2.1 Site Details

Wivenhoe Quarry (East) is situated between Wivenhoe and Alresford at Elmstead Heath, approximately 3.5km to the south-east of Colchester, Essex. The site is located at National Grid Reference (NGR) TM 05855 22582 and shown on drawing referenced W328-00062-01-D Location Plan.

The B1027 bounds the northern perimeter of the Site and will provide the main access route to the Site. Several residential properties are situated along this road to the north and east of the Site. The Site is surrounded predominantly by agricultural land, isolated dwellings, woodland and water bodies. Neighbouring land use include agriculture, specifically arable cropping, with a number of Sand and Gravel quarries in the wider area.

The site covers an area of ~60.9ha and currently exists as agricultural field parcels delineated by hedgerows. The site is bisected by a Public Right of Way (footpath), which is an important recreational asset to the area around the site and a series of overhead power lines. The topography of the site rises from ~27mAOD along the western edge of the site to ~30mAOD within the central part of the site. Towards the north-east the ground elevation remains relatively flat. There is a fall in topography towards the south-east of the Site near Cockaynes Wood with elevations at Willow Lodge at ~27.5mAOD. The site topography is illustrated on Drawing W328-00062-02-D.

2.2 Proposed operations

The site is being developed as an extension to the existing Wivenhoe Quarry for the extraction of approximately 3.8 million tonnes of sand and gravel. The historical quarry and proposed extension are physically separated by the Sixpenny Brook, which hydrogeologically separates the two schemes. The site is set out within the Essex Minerals Local Plan as a “Preferred and Reserve Site” which provides “particular opportunities for new habitat areas”. The proposed mineral extraction zone covers an area of ~43.4ha and it is this area which will concern the recovery activity. The quarry will be developed in a phased manner in accordance with the requirements of the Planning Permission as illustrated on Drawing W328-00062-03-D.

The site is to be restored to a mixture of agriculture and low-level water-based nature conservation habitats, lowland meadow, woodland planting and hedgerow enhancement using approximately 1.2 million cubic metres of imported inert materials. The imported material quantity is expected to be approximately a third of the intended extractable mineral, which will be used to supplement on-site excavated materials i.e. quarry overburden and interburden. Therefore, the quantity of imported material required will be dependent on the proportion of recovered mineral. Materials will be imported throughout the operational period of the quarry at a rate proportional to the mineral output. The approved restoration scheme for the site including final ground contours is illustrated on Drawing W328-00062-12-D.

2.3 Potential Hazards

2.3.1 Discharges to surface or groundwater

The materials proposed for the recovery activity are classified as inert. These types of materials have an inherently low pollution potential and will largely comprise of soils characterised as 17 04 05 (soils and stones other than 17 05 03) and 20 02 02 (soils and stones). The full list of waste to be accepted has been taken from Standard Rules Permit SR2015 No.39 and is included in Table 1 of the Waste Recovery Plan (referenced K6008-ENV-R001). These wastes do not contain substances at concentrations that may present a risk to surface water or groundwater. After its deposit and subsequent profiling, the already low permeability of this material is further reduced. This further restricting the leachability of any potential soluble components and mobilisation of solids from its compacted surface. Further detail is provided in the Hydrogeological Risk Appraisal (K6008-ENV-R04) submitted with this application and will not be considered further in this ERA.

2.3.2 Odour

Due to the low or negligible organic content associated with the inert material proposed for use in the recovery activity it is considered very unlikely this material will represent a source of odour. It is also expected to present a negligible risk in terms of biogenic gas and leachate generation. Consequently, odour is not considered further in this report.

2.3.3 Noise and vibration

The existing Wivenhoe Quarry has been used for the extraction of sand and gravel including processing of quarried materials. The proposed development includes an extension to the Quarry for a further extraction of approximately 3.8 million tonnes of sand and gravel. This will necessitate the use of tracked excavators, dump trucks, mechanical screens, generators and delivery vehicles.

The noise associated with the recovery activity is expected to be significantly less than that associated with the quarrying activities. Nevertheless, there is still potential for noise and vibration to be generated from the restoration activity. This will be restricted to movement and operation of site plant within the existing quarry void and surrounds and delivery vehicles. The following noise mitigation measures are implemented at the Site and will be applicable to the recovery activity:

- All operations will be carried out in adherence to the hours stipulated by the site's planning permission.
- Noise levels shall not exceed the limits specified in the planning permission. For temporary operations including site stripping and restoration the site shall not exceed 70 dB LAeq 1hr.
- No vehicles and/or mobile plant used exclusively onsite shall be operated unless they have been fitted with broadband noise alarms to ensure that, when reversing, they do not emit a warning noise that would have an adverse impact on residential or rural amenity.
- All plant, equipment and machinery shall be fitted with and use an effective silencer and shall be maintained in accordance with the manufacture's specification at all times.
- Mitigation in the form of bunding and separation distances have been built into the design of the development.
- Site roads will be maintained with smooth pothole free surfaces, and subject to a 10 mph speed limit on all unsurfaced haul routes and 15 mph on surfaced haul routes.
- Site personnel will be instructed to carry out all routine operations in a manner that does not cause unnecessary levels of noise.

The risk associated with potential noise and vibration emissions and the management protocols used to control them are detailed in Table 2.

2.3.4 Fugitive / Visible Emissions

The nature of the proposed materials to be used in the restoration of the site (inert soils and stones) excludes the potential for the site to generate litter or attract pests. These types of emissions will not be considered further.

There is potential for dust emissions to arise during the deposit and profiling of potentially dry or dusty wastes, dry un-vegetated areas and vehicle movements on unpaved or dusty roads. There are no processes to be carried out on site which will involve Combustion, however there is potential for dust to form a visible plume and this will be managed through the controls discussed below.

The primary control for dust emission minimisation will be the restriction on the acceptance of dusty wastes for deposit. The site staff will enforce strict waste acceptance protocols to manage the deposit of potentially dusty wastes. Only soil, stones and other mineral based materials are proposed to be imported for the restoration activity. However, on site material comprising of stripped soil and subsoil will be utilised where possible.

The following control measures are in place at the Site as dictated by the planning permission and will be applicable to the recovery activity:

- The first 30m of the access road from the junction with the B1027 shall be kept free of mud, dust and detritus to ensure that such material is not carried onto the public highway.

- All vehicles leaving site will utilise appropriate wheel and underside chassis cleaning facilities to prevent materials, including mud and debris, being deposited on the public highway. The appropriate facilities will be subject to regular inspections and maintenance to ensure appropriate functionality for the duration of the development.
- All vehicles transporting materials to and from Site will be sheeted. All vehicles are to be regularly maintained and enclosed were possible.
- A site speed limit of 10 mph is set to on all unsurfaced haul routes and 15 mph on surfaced haul routes to prevent the raising of dust.
- Drop height will be minimised when handling material to prevent dust generation.
- Internal roads will consist of compacted material and shall be regularly maintained by grading in order to minimise dust generation. If necessary, a water bowser and/or road sweeper will be used to help minimise dust emissions from the operation.
- All site personnel will be trained as to the potential sources and effective mitigation of dust.
- Regular visual inspections will be conducted to ensure that any dust sources are identified and dealt with promptly.
- Mitigation in the form of bunding and separation distances have been built into the design of the development
- Restored areas will be seeded as soon as is practicable. The progressive restoration of the site will help to reduce the area of land exposed to wind blow.

The operator will ensure appropriate controls are in place during extreme weather conditions to prevent dust or particulates spreading beyond the site boundary, including restricting or suspending activities most likely to generate dust and particulates. Additionally, the operator will ensure stockpiles are minimised in size, appropriately contained/sealed and dampened down to reduce windblown dust as necessary. The Air Quality Assessment prepared for the planning permission is attached as Appendix A for reference.

The risks from fugitive emissions of dust and proposed management measures are discussed further in Table 3.

2.3.5 Mud

Mud can be entrained onto the highway by vehicles leaving the site after transit along unpaved roads or at point of deposit. Access to the site will be via B1027. Onsite vehicle movements will be on maintained roads and wheel cleaning measures will be employed. All drivers will be required to check their vehicles before leaving site. If a vehicle is observed to be particularly muddy and/or dusty, the driver will be redirected for wheel cleaning.

The primary receptor of any mud and debris on the road will be the B1027 road. If fugitive mud deposits are identified beyond the site entrance, a road sweeper will be utilised as necessary. All

haul roads will be regularly inspected and cleaned as necessary. The risks from fugitive emissions of dust and proposed management measures are discussed further in Table 4.

2.3.6 Accidents

There is potential for accidents to occur during this type of recovery activity which may have a detrimental environmental impact. This can include spillages of fuels or other polluting liquids; fires causing damage to containment measures or generating contaminated liquid; or, deliberate vandalism resulting in pollution similar to the aforementioned. The risks of pollution occurring from accidents and the proposed management measures are discussed further in Table 5.

2.4 Potential Hazard Pathways

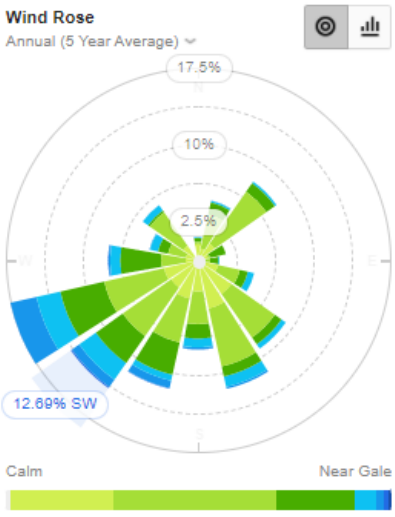
When identifying the receptors, the closest and most sensitive (if different from the closest) have been considered in each direction from the hazard and the mechanism of transport to each sensitive receptor (e.g. proximity to highway, access/egress points for mud and wind direction for airborne dust).

2.4.1 Meteorological Conditions

Weather and wind statistics are taken from the Alresford weather station[2] located approximately 1.3 km southeast of the Site boundary.

The windrose shows that the dominant wind direction is from the west-south-west towards the east-north-east (Figure 2.1).

Figure 2.1 – Wind Rose



[2] Alresford Wind Forecast, Essex CO7 8 - WillyWeather

2.4.2 Probability of Exposure

The probability of exposure is determined by the distance of the receptor to the site and the likelihood of the hazard reaching the receptor i.e. frequency of prevailing wind in that direction. The probability of exposure is irrespective of the type of hazard presented.

2.5 Hazard Receptors

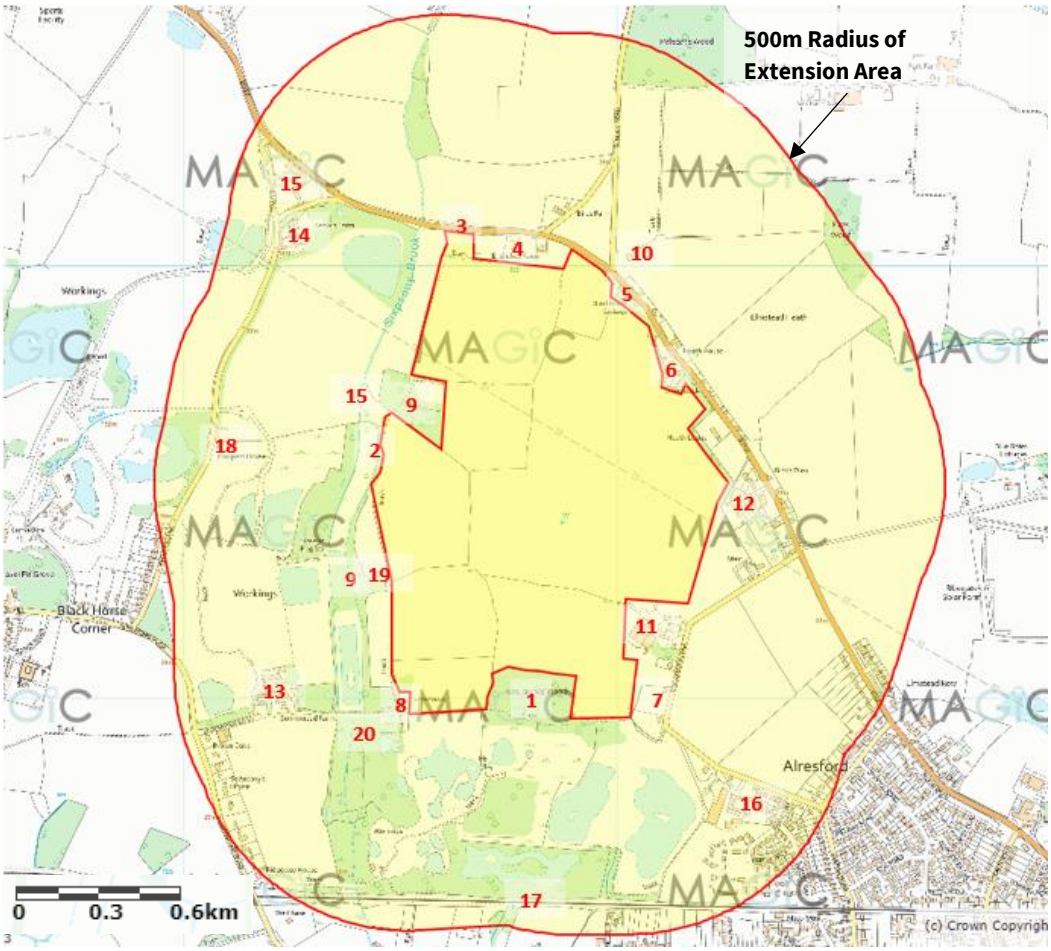
A review of the sensitive receptors within 500m is listed in Table 1. The location of each sensitive receptor is indicated in Figure 2.2. The site is surrounded predominantly by agricultural land, isolated dwellings, woodland and water bodies. The dominant land use in the area is agricultural, specifically arable cropping, with a number of Sand and Gravel quarries in the wider area.

The closest receptor to the site is the B1027 road, which bounds the northern perimeter of the Site. Several residential properties are situated along this road to the north and east of the Site. The closest residential properties are Englishes Farm & Rosedene located ~10m north and Wilwyn and adjacent properties located ~10m northeast of the Site. Further residential properties, Direct Animal Feeds and Shrublands Nursery are located on Cockaynes Lane immediately to the east of the Site. Beyond Cockaynes Lane, the village of Alresford is positioned ~285m to the south-east. The Cockaynes Wood nature reserve bounds the southern perimeter of the Site. To the south of this is a railway line which passes east-west. The Sixpenny Brook flows north to south adjacent to the western boundary of the Site and passes through the Cockaynes Wood nature reserve.

Table 1 – Sensitive Receptors within 500m of Wivenhoe Quarry site boundary

Receptor Reference	Receptor	Category	Direction from Site	Approximate distance from the site boundary (m)	Frequency Downwind (%)
1	Cockaynes Wood	Priority Habitat	S	<10	1.9
2	Sixpenny Brook	Watercourse	W	<10	1.8
3	B1027 road	Public Highway	N	<10	7.3
4	Englishes Farm and Rosedene	Residential	N	<10	7.3
5	The Fieldings & adjacent properties	Residential	NE	15	12.7
6	Wilwyn and adjacent properties	Residential	E	15	7.4
7	Willow Lodge and adjacent properties	Residential	E	<10	7.4
8	Furzedown	Residential	SW	<10	7.8
9	Piggery	Agriculture	W	<10	1.8
10	Mitchels Farm Shop	Commercial	NE	55	12.7
11	Direct Animal Feeds / Shrublands Nursery	Industrial / Commercial	E	15	7.4
12	Garage	Industrial / Commercial	E	10	7.4
13	Sunnymead Farm / Scott's Sandwiches	Agriculture / Commercial	W	230	1.8
14	Keelars Farm	Agriculture / Residential	W	310	1.8
15	Sibbons Plan and Sales	Industrial / Commercial	NW	280	8.8
16	Alresford	Residential / Commercial	SE	285	5.5
17	Railway Line	Railway	S	430	1.9
18	Properties of Keelars Lane	Residential	W	340	1.8
19	Footpaths	Public Right of Way	Surrounding Site	<10-500	1.8-15.7
20	Villa Wood	Priority Habitat	SW	25	7.8

Figure 2.2 – Location of Sensitive Receptors



2.6 Potentially Sensitive Habitats

2.6.1 Protected Habitats, Watercourses and Waterbodies

There are no designated sites within 500m of the site. The site is located in close proximity to Priority Habitat in the form of Deciduous Woodlands (including Cockaynes and Villa Woods) and Traditional Orchards, including that found on the northern site boundary. Cockaynes Woodland which is an area of designated Ancient woodland managed by the Essex Wildlife Trust and the Cockaynes Wood Trust. The Sixpenny Brook flows north to south adjacent to the western boundary of the Site and passes through the Cockaynes Wood nature reserve.

The Sixpenny Brook flows into the Colne Estuary approximately 1.2km south east of the site. The Colne Estuary is characterised as a Ramsar site, Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and Special Protection Area (SPA).

The nearest SSSI to the site is Wivenhoe Gravel Pit which contains series of Pleistocene sediments and located about 640m north west of the site.

2.6.2 Protected Species

As part of the site's most recent planning application (ESS/17/18/TEN), the Wivenhoe Quarry Extension was subject to a number of habitat and species-specific surveys and accompanying Ecological Impact Assessment (EcIA)[3].

No evidence of European Water Voles was recorded during these surveys in 2015 and 2018 including within the adjacent Sixpenny Brook on the western boundary of the site. The EcIA concluded that the Sixpenny Brook was of 'low suitability' for Water Voles and recommended that no further surveys were necessary at the Site. It was also recommended that a 10m buffer between the site and the Sixpenny Brook is maintained to avoid the potential for pollutants to be collected within surface run-off and enter the watercourse.

No waterbodies were identified within the proposed extension area and therefore habitats suitable for Great Crested Newts were not present. Consequently, surveying was focused on the 33 waterbodies identified within 500m of the Site. Two ponds within this radius identified great crested newts and therefore it was recommended that although these will not directly be affected by the proposed extension, a 10m buffer zone between the working area and the inner edge of field margins is maintained throughout the development of the site to avoid disturbance of the Great Crested Newt population identified in these locations. With this mitigation in place, it was concluded that the loss of habitat at the Site is minimal. Moreover, with the emplaced mitigation measures specified in Table 3 below, resulting from the deposit for recovery activity would provide a net increase in habitat availability.

[3] Crestwood Environmental (March, 2019) Ecological Impact Assessment (EcIA)

3 Risk Assessments and Accident Management Plans

3.1 Risk Assessments

The site-specific risk assessments completed for Noise, Dust and Mud are detailed in Tables 2 to 4 below. Where there is an inter-relationship between the specific risk assessment and meteorological conditions, this has been identified. The pathway is determined by the location of the receptor relative to the site, the distance from the boundary (m) and the frequency (likelihood) the prevailing wind will blow in the direction of the receptor (%) as determined by historical wind rose data for Alresford weather station located approximately 1.3 km southeast of the Site boundary.

The Mitigated Risk is the residual risk presented by the hazard after control measures have been implemented. This is the most realistic representation of the risk as effective controls will be maintained under the requirements of the environmental permit, planning consent and management procedures set out in the Operator's Environmental Management System (EMS).

3.2 Environmental Accidents

The Agency guidance requires the completion of an Accident Risk Assessment Management Plan. This should assess potential hazards associated with the proposed activity not described in the sections above.

An accident management plan is detailed in Table 5.

Table 2 – Noise and Vibration Risk Assessment and Management Plan

Hazard / Pathway	Receptor				Probability of Exposure	Unmitigated Consequence	Unmitigated Risk	Risk Management	Mitigated Risk
	No.	Dist* (m)	Direc[n]	Freq** (%)					
Noise through air and Vibration through ground from: Vehicle / plant movement with delivering and handling of waste	1	<10	S	1.9	High – close proximity to Site	Medium – potential noise disturbance to wildlife	Medium	Waste recovery activities are unlikely to generate noise in excess of the sand and gravel extraction activities. Mitigation in the form of bunding and separation distances has been built into the design of the quarry. Planning condition restricts site operational hours Noise levels must not exceed the limits specified in the planning permission and noise monitoring is required. On site speed limits will be enforced and internal site roads will be maintained. Silencers will be used on vehicles and will be maintained in accordance with the manufacturer's or supplier's specification. Where practicable, engines to be switched off when not in use. Exclusively onsite vehicles and plant will be fitted with broadband noise alarms to ensure that when reversing they do not emit a warning noise that would impact on residents or rural amenity. Deposit of material will not be undertaken from height to reduce noise / vibration.	Low
	2	<10	W	1.8	High – close proximity to Site	Low – not sensitive to noise (watercourse)	Medium		
	3	<10	N	7.3	High – close proximity to Site	Low - transient noise annoyance	Medium		
	4	<10	N	7.3	High – close proximity to Site	High – noise annoyance to residents	High		
	5	15	NE	12.7	High – close proximity to Site	High – noise annoyance to residents	High		
	6	15	E	7.4	High – close proximity to Site	High – noise annoyance to residents	High		
	7	<10	E	7.4	High – close proximity to Site	High – noise annoyance to residents	High		
	8	<10	SW	7.8	High – close proximity to Site	High – noise annoyance to residents	High		
	9	<10	W	1.8	High – close proximity to Site	Medium – noise annoyance to farmers	Medium		
	10	55	NE	12.7	High – close proximity to Site	Medium – noise annoyance to staff	Medium		
	11	15	E	7.4	High – close proximity to Site	Medium – noise annoyance to staff	Medium		
	12	10	E	7.4	High – close proximity to Site	Medium – noise annoyance to staff	Medium		
	13	230	W	1.8	Medium – proximity to Site	Medium – noise annoyance to staff	Medium		
	14	310	W	1.8	Low – distance from Site	High – noise annoyance to residents	Medium		
	15	280	NW	8.8	Medium – proximity to Site	Medium – noise annoyance to staff	Medium		
	16	285	SE	5.5	Medium – proximity to Site	High – noise annoyance to residents	Medium		
	17	430	S	1.9	Low – distance from Site	Low - transient noise annoyance	Low		
	18	340	W	1.8	Low – distance from Site	High – noise annoyance to residents	Medium		
	19	<10-500	Surrounding Site	1.8-15.7	High – close proximity to Site	Medium - transient noise annoyance	Medium		
	20	25	SW	7.8	High – close proximity to Site	Medium – potential noise disturbance to wildlife	Medium		

Table 3 – Fugitive Dust Emission Risk Assessment and Management Plan

Hazard / Pathway	Receptor				Probability of Exposure	Unmitigated Consequence	Unmitigated Risk	Risk Management	Mitigated Risk
	No.	Dist* (m)	Direc[n]	Freq** (%)					
Fugitive dust emissions generated by: Vehicle movements and handling of waste on site	1	<10	S	1.9	High – close proximity to Site, occasionally downwind	Medium – potential deposition on sensitive vegetation	Medium	Site staff will enforce strict waste acceptance protocols to manage the deposit of potentially dusty wastes. All vehicles will use wheel and underside chassis cleaning facilities to prevent materials being deposited on the public highway. The facility will be appropriately maintained to ensure its effectiveness. Site staff at the weighbridge will check departing vehicles. All vehicles transporting materials to and from Site will be sheeted. All vehicles are to be regularly maintained and enclosed were possible. On site speed limits will be enforced and internal site roads will be maintained. If necessary, a water bowser and/or road sweeper will be used to help minimise dust emissions from the operation. Regular visual inspections will be conducted to ensure that any dust sources are identified and dealt with promptly. Mitigation in the form of bunding and separation distances have been built into the design of the development Restored areas will be seeded as soon as is practicable. The progressive restoration of the site will help to reduce the area of land exposed to wind blow. Inert material to be placed directly within the quarry void. Where stockpiling is deemed necessary, this will occur within the quarry void.	Low
	2	<10	W	1.8	High – close proximity to Site, occasionally downwind	Medium – potential accumulation in watercourse	Medium		
	3	<10	N	7.3	High – close proximity to Site, infrequently downwind	High - potential hazardous road conditions	High		
	4	<10	N	7.3	High – close proximity to Site, infrequently downwind	High – dust annoyance to residents	High		
	5	15	NE	12.7	High – close proximity to Site, frequently downwind	High – dust annoyance to residents	High		
	6	15	E	7.4	High – close proximity to Site, infrequently downwind	High – dust annoyance to residents	High		
	7	<10	E	7.4	High – close proximity to Site, infrequently downwind	High – dust annoyance to residents	High		
	8	<10	SW	7.8	High – close proximity to Site, infrequently downwind	High – dust annoyance to residents	High		
	9	<10	W	1.8	High – close proximity to Site, occasionally downwind	Medium – dust annoyance to farmers	Medium		
	10	55	NE	12.7	High – close proximity to Site, frequently downwind	High – dust annoyance to staff	High		
	11	15	E	7.4	High – close proximity to Site, infrequently downwind	Medium – dust annoyance to staff	Medium		
	12	10	E	7.4	High – close proximity to Site, infrequently downwind	Medium – dust annoyance to staff	Medium		
	13	230	W	1.8	Medium – proximity to Site, occasionally downwind	High – dust annoyance to staff	Medium		
	14	310	W	1.8	Low – distance from Site, occasionally downwind	High – dust annoyance to residents	Medium		
	15	280	NW	8.8	Medium – proximity to Site, infrequently downwind	Medium – dust annoyance to staff	Medium		
	16	285	SE	5.5	Medium – proximity to Site, infrequently downwind	High – dust annoyance to residents	Medium		
	17	430	S	1.9	Low – distance from Site, occasionally downwind	Low – transient dust nuisance	Low		
	18	340	W	1.8	Low – distance from Site, occasionally downwind	High – dust annoyance to residents	Medium		
	19	<10-500	Surrounding Site	1.8-15.7	High – close proximity to Site, frequently downwind	Medium – transient dust nuisance	Medium		
	20	25	SW	7.8	High – close proximity to Site, frequently downwind	Medium – potential deposition on sensitive vegetation	Medium		

Table 4 – Fugitive Mud Emission Risk Assessment and Management Plan

Hazard / Pathway	Receptor				Probability of Exposure	Unmitigated Consequence	Unmitigated Risk	Risk Management	Mitigated Risk
	No.	Dist* (m)	Direc[n]	Freq** (%)					
Fugitive mud emissions generated by: Vehicle movements onto public roads	1	<10	S	1.9	Low – no physical connection	Low – no impact	Low	All vehicles will use wheel and underside chassis cleaning facilities to prevent mud / dust being trailed onto adjacent roads and creating a hazard / nuisance. Site staff at the weighbridge and at the tipping face will be vigilant to excessive mud tracked from the site by visiting HGV's and site plant. Any vehicles observed to be carrying mud in their tyres will be directed back through the cleaning facilities until the wheels are clean before leaving site. The integrity of the haul roads will be regularly assessed to ensure the surface is not accumulating mud that could be tracked off site. Repairs will be made to surfaced roads or where potholes / low points are causing water or mud to accumulate. A road sweeper will regularly clean the site haul roads and public highway as necessary. Drivers will be reminded of their responsibility to maintain clean vehicles and not to track mud onto the public highway.	Low
	2	<10	W	1.8	Low – no physical connection	Low – no impact	Low		
	3	<10*	N	7.3	High – direct contact with Site (B1027)	High - potential hazardous road conditions	High		
	4	100*	N	7.3	High – direct contact with B1027	High - potential hazardous road conditions	High		
	5	420*	NE	12.7	Medium – direct contact with B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	6	650*	E	7.4	Medium – direct contact with B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	7	1,600*	E	7.4	Low – significant distance by road from site entrance to receptor	High - potential hazardous road conditions	Medium		
	8	<10	SW	7.8	Low – no physical connection	Low – no impact	Low		
	9	<10	W	1.8	Low – no physical connection	Low – no impact	Low		
	10	410*	NE	12.7	Medium – direct contact with B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	11	1,470*	E	7.4	Low – significant distance by road from site entrance to receptor	High - potential hazardous road conditions	Medium		
	12	1,000*	E	7.4	Medium – direct contact with B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	13	230	W	1.8	Low – no physical connection	Low – no impact	Low		
	14	460*	W	1.8	Medium – direct contact with B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	15	540*	NW	8.8	Medium –Tye Lane connects to B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	16	1,410*	SE	5.5	Medium –Tye Lane connects to B1027 but significant distance by road	High - potential hazardous road conditions	Medium		
	17	430	S	1.9	Low – no physical connection	Low – no impact	Medium		
	18	990*	W	1.8	Low – significant distance by road from site entrance to receptor	High - potential hazardous road conditions	Medium		
	19	<10-500	Surrounding Site	1.8-15.7	Low – no physical connection	Low – no impact	Low		
	20	25	SW	7.8	Low – no physical connection	Low – no impact	Low		

Notes: * approximate distance by road

Table 5 – Accident Management Plan

Hazard	Receptor	Pathway	Probability	Consequence	Overall Risk	Risk Management	Mitigated Risk
Fuel / engine oil Leak or damage to portable fuel bowser, static fuel storage tank or site vehicles	Groundwater	Base of quarry	Low	High - pollution of groundwater	Medium	Fuel and engine oils will be stored within appropriate secondary containment and with spillage contingencies; Site vehicles will not be refuelled within recovery area; Site vehicles and plant subject to regular preventative maintenance in accordance with EMS procedures.	Low
Fire Uncontrolled burning of wastes, gas or site vehicles.	Groundwater	Base of quarry	Low	High - pollution of groundwater through firewater run-off or leaks from damaged equipment	Medium	Wastes to be accepted at site will effectively be inert, have a low organic content and inherently non-combustible in nature, or through production of landfill gas; Site vehicles and plant subject to regular preventative maintenance in line with site EMS procedures; Fire control equipment will be on hand, with major incidents to be dealt with by the Fire Brigade in accordance with site EMS Procedures. No smoking except in designated areas.	Low
	Receptors listed in Table 1 above	Airborne	Low	Medium - smoke / odour annoyance	Medium		
Explosion Compressed gas cylinders, combustion of gas or fuel storage tank	Site staff	Airborne	Low	High - danger of serious injury	Medium	Fuel and engine oils will be stored within appropriate secondary containment with appropriate controls to prevent fire or explosion (i.e. no smoking on site); Compressed gases not required and therefore present for operation of recovery activity. Low organic content of waste will generate negligible volumes of landfill gas and will not present an explosion risk.	Low
	Groundwater	Base of quarry	Low	High - pollution of groundwater through leaks from damaged equipment	Medium		
Wastes deposited Chemical reaction of incompatible wastes	Receptors listed in Table 1 above	Airborne	Low	Medium - odour annoyance or smoke from oxidising agents	Medium	Waste acceptance protocols will exclude the deposit of chemically reactive wastes. Those accepted will be of an inert nature and will not generate noxious gases or contaminating leachate.	Low
Vandalism Damage to site vehicles, fuel bowsers, gas or leachate extraction pipework	Groundwater	Base of quarry	Low	High - pollution of groundwater through leaks from damaged equipment	Medium	Site security will prevent access by unauthorised persons. Vehicles will be kept overnight in a secure area with appropriate security measures; Wastes not expected to require exposed active gas or leachate control infrastructure which could be subject to damage.	Low
	Receptors listed in Table 1 above	Airborne	Low	Medium - odour annoyance	Medium		
Leachate Accidental damage to leachate monitoring chamber	Groundwater	Base of quarry	Low	High - pollution of groundwater through leaks from damaged well	Medium	Wastes not expected to require active gas or leachate control infrastructure which could be exposed to damage; CQA supervision will prevent damage to basal drainage pipework with the deposit of waste.	Low

4 Conclusion

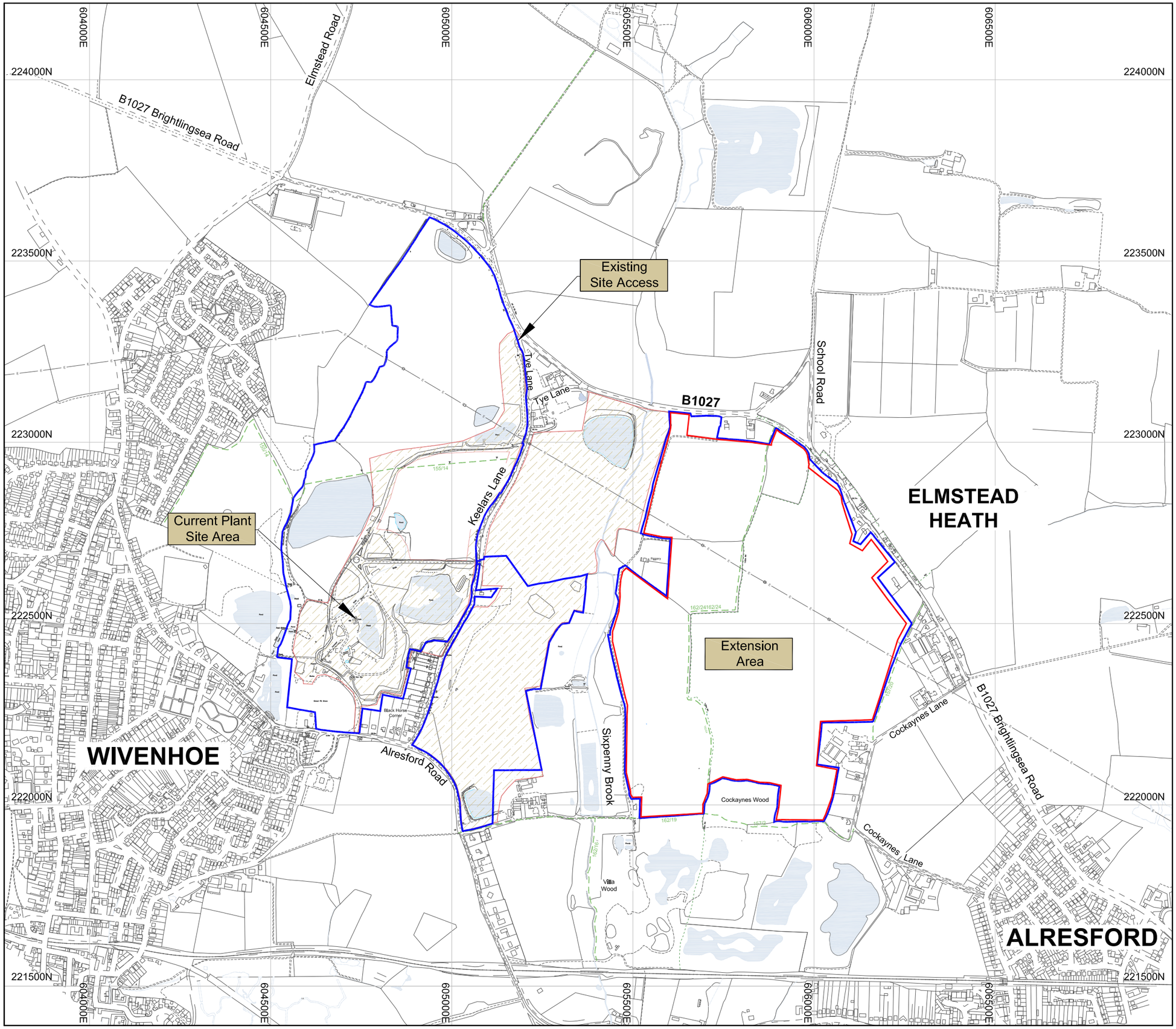
The operational hazards associated with the proposed recovery activities have been considered in the tables above. It has been concluded that with the use of appropriate mitigating controls where necessary, the recovery activity will not present a significant risk to surrounding receptors.

The potential hazards for emissions to groundwater and surface water, noise & vibration, dust, mud and accidents have been considered and the risks associated have been reduced and managed as far as reasonably practicable. The most sensitive receptors have been identified and their impacts of any emissions from sites have been addressed with mitigation measures in place. As a result, it is considered that any emissions from the operations of Wivenhoe Quarry with all management techniques in place will not have a detrimental impact on the sensitive receptors identified.

Appendix A – Air Quality Assessment

(submitted as part of Planning Application)

Drawings



Legend

- Boundary: Application Site
- Boundary: Other Land Under Applicants control
- Extent of Planning Consent ESS/41/12/TEN
- 162/24 Existing Public Right of Way and reference

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name:
W328 - Wivenhoe

Drawing Name:
Location Plan

Drawn By:	Scale @ A3:
DJA	1:10,000
Date:	**Drawing Number:**
21/10/2019	W328-00062-01-D

Elmstead Heath

Legend

- Boundary: Application Site
- Boundary: Proposed Extraction Area
- 27 — Existing Ground Surface Contour at 0.5m interval
- Existing Vegetation
- 157/2 — Existing Public Right of Way and Reference
- Permissive Footpath

TARMAC
A CRH COMPANY

Site Name: W328 - Wivenhoe

Drawing Name: Existing Situation

Drawn By:	Scale @ A1:
DJA	1:2,000
Date:	**Drawing Number:**
21/10/2019	W328-00062-02-D

DAVID JARVIS ASSOCIATES

Elmstead Heath

B1027

School Road

Tye Lane

Keelars Tye

Keelars Farm

Pond

Birds Farm

Englishes Farm

Rosedene

Mitchels Farm Shop

Beulah

The Fieldings

Blackboard Cottage

Boarded Cottage

Lee Oak

Lagoon 3 restored to wet woodland

The Orchards

Near Dun

Wilwyn

Europa

Woodstock

Oakwood Cottage

Primrose Cottage

Vine Cottage

Heath Lodge

Woodlands

Kimbar Gardens

St Christophers

Sixpenny Brook

Piggery

Proposed viewpoint from footpath overlooking restored wetland mosaic within Lagoon 4

Proposed new permissive footpath link between footpath 157/20 and 162/24

Pond

Small retained sand and gravel cliff (up to 1 - 2m high)

Heath Farm

Broadview Cottages

Cockaynes Lane

Willow Lodge

White Lodge

Cockaynes Wood

Target areas to be identified for natural regeneration trials managed through the BEP

Furzedown

Sunnymead Farm

Ponds

Villa Wood

162/24

162/19

162/16

157/2

157/20

Legend

- Boundary: Application Site
- Boundary: Proposed Extraction Area
- 27 — Existing Ground Surface Contour at 0.5m interval
- 30 — Proposed Restoration Ground Surface Contour at 0.5m interval
- Existing Vegetation
- Existing Vegetation (to be retained)
- 157/2 — Existing Public Right of Way and Reference
- Permissive Footpath
- Proposed New Permissive Footpath
- Proposed Hedgerow with Standard Trees
- Proposed Specimen Oak Tree Planting
- Land Restored to Lowland Acid Grassland
- Land Restored to Grassland Field Margins
- Land Restored to Woodland
- Land Restored to Wet Woodland
- Land Restored to Woodland in land not within Applicant's Control
- Land Restored to Open Mosaic Habitat and Reedbed
- Land Restored to Exposed Margins/ Mudflat
- Land Restored to Lowland Meadow
- Open Water
- Retained Sand and Gravel Cliffs

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name: W328 - Wivenhoe

Drawing Name: Proposed Restoration Scheme

Drawn By:	Scale @ A1:
DJA	1:2,000
Date:	**Drawing Number:**
21/10/2019	W328-00062-12-D

Elmstead Heath

Proposed Site Access

B1027

Tye Lane

Keelars Tye

Keelars Farm

Pond

Birds Farm

School Road

Englishes Farm

Rosedene

Mitchels Farm Shop

162/24

BUND A

BUND B

BUND C

BUND D

BUND E

BUND F

BUND G

BUND H

BUND I

FRESHWATER LAGOON

LAGOON 1

LAGOON 2

LAGOON 3

LAGOON 4

PROPOSED LOCATION OF TUNNEL UNDER FP24

FOOTPATH 162/24 RETAINED THROUGHOUT AND SECURED WITH FENCING AS APPROPRIATE

30m STAND OFF TO COCKAYNES WOOD

Phase 1 and Plant Site

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

Beulah

The Fieldings

Blackboard Cottage

Boarded Cottage

Lee Oak

The Orchards

Near Dun

Wilwyn

Europa

Woodstock

Oakwood Cottage

Primrose Cottage

Vine Cottage

Heath Lodge

Heath Farm

Broadview Cottages

Willow Lodge

White Lodge

Woodlands

Kimbar Gardens

St Christophers

Cockaynes Lane

Cockaynes Wood

Villa Wood

Piggery

Sixpenny Brook

Furzedown

Sunnymead Farm

Ponds

Pump House

157/20

157/2

162/19

162/16

Legend

- Boundary: Application Site
- Boundary: Proposed Extraction Area
- Phase 1 — Proposed Phasing
- Proposed Direction of Working
- 27 — Existing Ground Surface Contour at 0.5m interval
- Existing Vegetation
- 157/2 — Existing Public Right of Way and Reference
- Permissive Footpath
- Proposed Soil Stores
- Proposed Silt Lagoons
- Root Protection Area and Tree Reference

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name: W328 - Wivenhoe

Drawing Name: Proposed Working Plan

Drawn By:	Scale @ A1:
DJA	1:2,000
Date:	**Drawing Number:**
21/08/2019	W328-00062-03-D

IRELAND | UK | UAE | BAHRAIN | KSA

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