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Wivenhoe Quarry

Climate Change Risk Assessment

Tarmac Limited

Report No. 14-K6008-ENV-R006
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Disclaimer: Please note that this report is based on specific information, instructions, and information from our Client and should not be relied upon by third parties.					

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1 Introduction

1.1 Report Objectives

ByrneLooby Partners (UK) Ltd (ByrneLooby) have been commissioned by Tarmac Trading Limited (Tarmac) to produce an Environmental Permit Application for the restoration of the Wivenhoe East Quarry under a recovery permit. This report presents a Climate Change Risk assessment as required by the climate change screening score, Question 6b on Application Form B2.

There is an obligation 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. The approved restoration scheme comprises a combination of return to agricultural land and the creation of low-level water-based nature conservation habitats, lowland meadow, woodland planting and hedgerow enhancement.

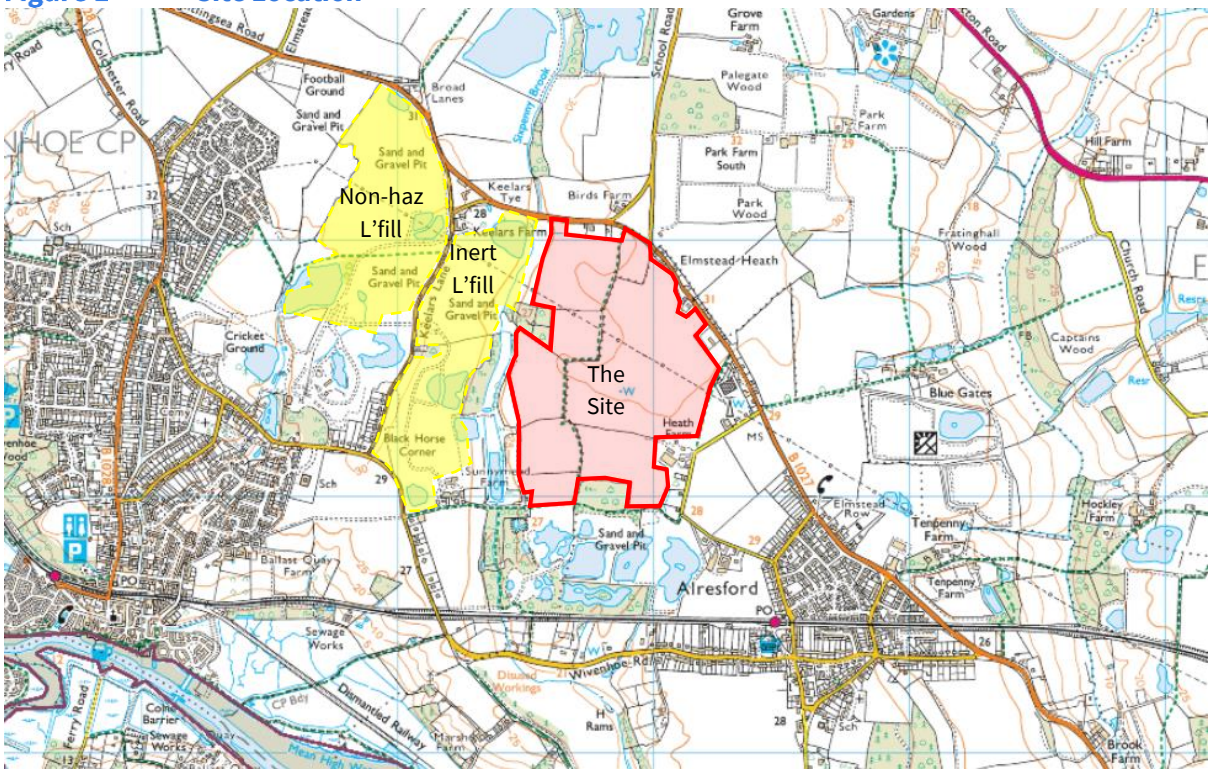
A Recovery Permit is required as, to recreate the landscape, a proportion of the removed mineral will be replaced by imported soils and other inert materials. This Climate Change Risk Assessment has been prepared to assess the possible impacts on the environment from extreme weather events.

1.2 Site Background

The Site is located between Wivenhoe and Alresford at Elmstead Heath, some 3.5km to the south-east of Colchester, Essex and is centred at National Grid Reference (NGR) TM 05855 22582. The Site covers an area of ~60.9ha and currently exists as agricultural field parcels delineated by hedgerows.

The topography of the site is almost entirely level and only varies by 3m, 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.

Figure 1 Site Location



Inert L'fill = Mapped Inert Landfill EPR/3194LV Non-haz L'fill = Mapped Biodegradable Landfill EPR/PP3199NN in operational quarry (Note landfill's are smaller than permitted /licensed areas)

2 Receptors

2.1 Site Based Impacts

2.1.1 Sensitive Habitats

The site is located in the Anglian River Basin and is located within Flood Risk Zone 1 which means it is assessed as having a less than 1 in 1,000 annual probability of river or sea flooding. The site is therefore considered to be at low risk from flooding. Long term flood risk has also been investigated on the UK Government website[1] and there is very low risk in this area (Figure 2).

[1]https://checklongtermfloodrisk.service.gov.uk/map?easting=605766&northing=222212&map=SurfaceWater

Figure 2 Long Term Food Risk Map

Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected

There are several watercourses within the local vicinity of the site. The nearest of these is the Sixpenny Brook which flows north to south adjacent to the western boundary of the Site and then flows in an easterly direction to the south of the Cockaynes Wood nature reserve. The Sixpenny Brook flows into the Alresford Creek approximately 3km southeast of the site. Arlesford Creek is a tidal arm of the River Colne formed by the Sixpenny Brook and the Tenpenny Brook a north to south flowing stream, which at its closest is 1.6km to the east of the Site.

A search of DEFRAs Magic website[2] showed that there are no Statutory Designated sites within 500m of the site boundary. The Wivenhoe Gravel Pit SSSI is located approximately 650m northwest of the site boundary and contains series of Pleistocene sediments. The Colne Estuary is located approximately 1.2km southeast of the site and is characterised as a Ramsar site, Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and Special Protection Area (SPA).

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.

2.2 Sector Based Impacts

The following sector based potential impacts are considered most likely to pose a potential issue at the site :

[2] https://magic.defra.gov.uk/MagicMap.aspx

- Potential for increased surface water and flooding due to extreme rainfall. Drainage to be overwhelmed
- Potential increase in dust from operations due to prolonged periods of hot dry weather.
- Changes in river flow due to increased rainfall and storm events. Discharge problems due to elevated river level

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.

3 Risk Assessment

Please see Appendix A, the Anglian Basin worksheet has been completed for this site.

4 Control Measures

Control of surface water discharge:

The superficial aquifer unit will be terminated once quarrying operations begin at the site. Consequently, baseflow to Sixpenny Brook adjacent to the site will be replaced by the dewatering programme and surface water discharge. It is therefore anticipated that any short-term increase in surface water runoff from storm events could be managed at the site by reducing discharge from dewatering lagoons into the brook until the excess surface water at the site had been removed.

Discharge from the site will always be proportionate to river flow as this will be influenced by rainfall and storm events. Where there is increased surface water runoff the river flow will be increased and when there is low surface water run-off the river flow will be less therefore any inputs to the river will be proportional.

Control of increased dust:

Dewatering lagoons will be used to supply water for dust suppression and wheel washing. If increased rainfall and storm events occur as predicted then these lagoons will contain sufficient water to use for dust suppression in the summer months.

Currently an agricultural Abstraction licence is present in the centre of the site and is utilised for irrigation of arable crops. When the recovery operation begins on the quarry this licence will no longer be required and abstraction from groundwater at this location will cease. This means that there will be no net increase in the water used at the site for dust suppression and it is anticipated

that the volumes of water required for irrigation are substantially higher than those for the suppression of dust.

Slow vehicle movement on site to reduce the potential for dust spread.

Control of surface water flooding:

Permitted limits of discharge rate will be applied at the site during the recovery operation therefore providing a control on maximum daily discharge volumes from the site.

Restoration of the site will provide a new surface water catchment area in the form of a lake at the site and habitats associated with this wetland area. This restoration plan will reduce rapid run off as the wetland area will have the capacity for increased surface water storage compared to the current land use which is an agricultural field.

This lake is to be created within the site will be primarily recharged from direct infiltration and run-off from the surrounding sloped ground into the lake. It is expected that this could form a closed and isolated hydraulic system independent of the wider groundwater system and therefore can act as further surface water attenuation.

5 Adaptation Plan

Given the low-risk nature of the site and the control measures that will be implemented to manage any potential Climate change risk an Adaptation Plan is considered unnecessary.

6 Monitoring, Recording and Review

The Climate Change risk assessment and control measures will be reviewed every two years to ensure that mitigation measures remain suitable at the site.

The effects of extreme weather events at the will be recorded including:

- date
- weather event
- extent of incident
- damage or effect to the business or environment
- immediate action taken
- proposed prevention or mitigation measures

Appendix A – Risk Assessment Worksheet

Anglian river basin district: climate change risk assessment worksheet

Name (as on your part A application form):

Our permit reference number (if you have one):

Your document reference number:

Risk assessment worksheet for the 2050s

Anglian river basin district

You must carry out a climate change risk assessment for any new bespoke waste and installations permit applications if you expect to operate for more than 5 years. Use the user guide to complete the table. You can add in extra pages if necessary.

Consider how your operations will be affected by the changes in weather and climate described in the table. Consider any changes to average climate conditions that may impact on your operations, for example extreme rainfall.

Also consider:

- critical thresholds - where a 'tipping point' is reached, for example a specific temperature where site processes cannot operate safely
- changes to averages - for example an entire summer of higher than expected rainfall causing waterlogging
- where hazards may combine to cause more impacts

You can add in other climate variables if you wish.

If you have stated on your application form that you do not expect to be operational in 2050, you must still consider climate change risks for the time you do intend to operate. Whilst the variables are for the 2050s, this is an estimated date and you may experience these conditions before then.

This worksheet will sit in your management system. It must appear on the management system summary you submit with your application, even if you do not need to submit the whole risk assessment with your application.

If your pre-mitigation risk score (column D) is 5 or higher, you must complete columns E to H.

Potential changing climate variable	**A** **Impact**	**B** **Likelihood**	**C** **Severity**	**D** **Risk** (B x C)	**E** **Mitigation** (what will you do to mitigate this risk)	**F** **Likelihood** (after mitigation)	**G** **Severity** (after mitigation)	**H** **Residual risk** (F x G)
1. Summer daily maximum temperature may be around 7°C higher compared to average summer temperatures now.	No impact expected	1	1	1	No mitigation required as very low risk. Score under 5			
2. Winter daily maximum temperature could be 4°C more than the current average, with the potential for more extreme temperatures, both warmer and colder than present	No impact expected	1	1	1	No mitigation required as very low risk. Score under 5			

Potential changing climate variable	**A** **Impact**	**B** **Likelihood**	**C** **Severity**	**D** **Risk** (B x C)	**E** **Mitigation** (what will you do to mitigate this risk)	**F** **Likelihood** (after mitigation)	**G** **Severity** (after mitigation)	**H** **Residual risk** (F x G)
3. The biggest rainfall events are up to 20% more intense than current extremes (peak rainfall intensity)*.	Increased surface water and risk of flooding Surface water drainage system over capacity	3	2	6	Increase surface water storage capacity. The surface water management plan will need to take increases into consideration.	3	1	3
4. Average winter rainfall may increase by 35% on today's averages.	Increased surface water and risk of flooding. But limited by nature of site – Large void filled with inert material- high water storage capacity	3	1	3	No mitigation required as very low risk. Score under 5	3	1	3
5. Sea level could be as much as 0.6m higher compared to today's level *.	Inland Site low impact expected	1	1	1	No mitigation required as very low risk. Score under 5			
6. Drier summers, potentially up to 39% less rain than now.	Increased dust from operations	3	2	6	Increase dust suppression and road sweeping. Increase surface water storage capacity to supply for such operations	3	1	3
7. At its peak, the flow in watercourses could be 35% more than now, and at its lowest it could be 80% less than now.	Discharge issues due to high river level, back up of drainage	2	3	6	Monitor peak and low river flows to find suitable discharge times and volumes	2	1	2

*Indicates data has come from climate change allowances as part of the spatial planning process. Evidence from your planning submission is acceptable evidence for this worksheet.

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