



## Water Environment Assessment

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Pincet Lane, North Kilworth

**Mick George Ltd**

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## Pincet Lane, North Kilworth, Leicestershire

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## Executive Summary

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- S1 Enzygo Limited was commissioned by Mick George Ltd to prepare a Water Environment Assessment for a proposed sand and gravel quarry (the Site) located at Pincet Lane, North Kilworth, Leicestershire, LE17 6NW.
- S2 The Site is presently agricultural land.
- S3 The Site is located in Flood Zone 1 and is at low risk of fluvial flooding. The Site is not at risk of tidal flooding or flooding from infrastructure or reservoir failure. The Site is at low risk of surface water and groundwater flooding. Consequently flooding is not considered to be a significant issue. There is no perceived risk from flooding to off-site receptors as a consequence of the development.
- S4 Surface and groundwater within the Site will be managed by appropriate operational management plans.
- S5 The proposed development will have no significant impact on surface or groundwater resources.

## 1.0 Introduction

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### 1.1 Background

1.1.1 Enzygo Limited was commissioned by Mick George Ltd to prepare a Water Environment Assessment for a proposed sand and gravel quarry located at Pincet Lane, North Kilworth, Leicestershire, LE17 6NW.

### 1.2 Proposed Development

1.2.1 The proposed development is for the phased extraction of superficial fluvio-glacial sands and gravels from 24ha of land. It is estimated that there are some 2.5Mt of proven reserves on the site, although a percentage may be beneath the water table.

### 1.3 Objectives

1.3.1 The objectives of the study are to:

- 1 Review the baseline hydrology and hydrogeology;
- 2 Identify the potential impacts of fluvial, surface water, groundwater and reservoir / infrastructure failure flooding to the development;
3. Determine the effects of development on surface water, groundwater resources and off-Site flood risk;
4. Recommend mitigation of any perceived on and off-Site risks
5. Produce a report on the findings of 1 to 4 above.

## 2.0 Site Description

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### 2.1 Site location

2.1.1 The Site is located at Land off Pincet Lane, North Kilworth, Leicestershire, LE17 6NW. The National Grid Reference (NGR) for the centre of the application area is 46260, 28620.

### 2.2 Existing Use

2.2.1 The Site is approximately 42.7ha in area, bisected by a farm track into two parcels of land. The two parcels comprise fields used for agriculture, bisected by hedgerows and mature trees. It is noted that the southern parcel of land has a farm building and a house located within the Site boundary on the eastern side.

2.2.2 The Site is bounded by Pincet Lane and Pincet Lodge to the east, Bosworth Road to the south, agricultural land and woodland to the west and agricultural land to the north. The Site can be accessed from Bosworth Road, Pincet Lane and the unnamed farm track which bisects the Site.

2.2.3 The Site is located on a plateau of low relief at an elevation ranging from 168 metres Above Ordnance Datum (mAOD) in the northwest to approximately 154mAOD in the south.

2.2.4 Most of the land is in arable use with eight fields cropped with winter wheat in August 2015.

### 2.3 Proposed Use

2.3.1 The proposed development is for the phased mineral extraction of superficial fluvio-glacial sands and gravels from 24ha of land. It is estimated that there are some 2.5Mt of proven reserves.

### 2.4 Sensitive Land Uses

2.4.1 The Site and surrounding land are either residential or agriculture.

2.4.2 No ecologically sensitive designations are identified on or in the vicinity of the Site.

2.4.3 English Heritage does not identify any Scheduled Ancient Monuments or Listed Buildings on the site.

## 3.0 Catchment and Site Hydrology

### 3.1 Catchment hydrology

- 3.1.1 The Site lies within the catchment of a tributary stream to the River Avon which joins the Avon at North Kilford. The site is at the head of the catchment, and the catchment area to a point on the watercourse adjacent to the Site is 1.17 km<sup>2</sup>.
- 3.1.2 The Standard Annual Average Rainfall (SAAR) for the catchment is 674 mm (FEH CDROM 3 data) and the annual evapotranspiration rate for this area of South Leicestershire is 494mm (MAFF 1975). Therefore, the effective rainfall (available for infiltration or runoff) is 674mm-494 mm = 180mm.
- 3.1.3 There is a large lake or pond adjacent to Bosworth Grange to the north east of the Site (Figure 2.1) and several small ponds or impoundments in the surrounding area.
- 3.1.4 The Grand Union Canal passes at a point approximately 1.3 km to the south east of the Site where it passes through a tunnel. The canal elevation is approximately 130mAOD at that location.

### 3.2 Site hydrology

- 3.2.1 The site is gently undulating but slopes from west to east.
- 3.2.2 The nearest watercourse is an internal open ditch land drain that bisects the site from west to east. The land drain conveys runoff eastward into the Avon tributary.
- 3.2.3 Field drains are likely to be present in much of the application area. These will discharge into shallow ditches which remove water eastward.

### 3.3 Flood risk

- 3.3.1 A summary of the potential sources of flooding and a review of the potential risk posed by each source at the application Site is presented in Table 1.

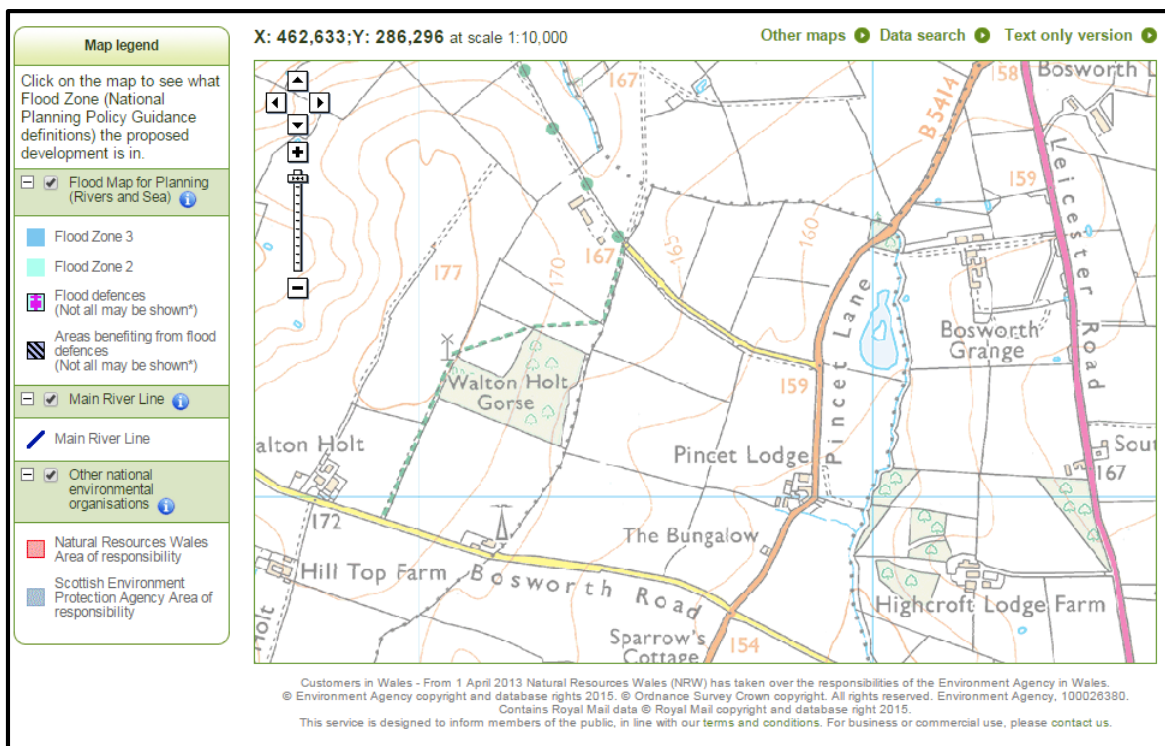
**Table 1: Potential Risk Posed by Flooding Sources**

Flooding Source	Potential Flood Risk at Application Site?	Potential Source	Data Sources
Fluvial	Yes (low)	Unnamed Land Drain (Ordinary Watercourse)	Environment Agency, SFRA
Tide	No	None Identified	Environment Agency
Groundwater	Yes- high groundwater table	Sand and gravel aquifer	Borehole Records, SI reports
Surface Water	Yes	Poor permeability	Environment Agency
infrastructure failure	No	None Identified	Environment Agency. OS Map

### Fluvial flooding

- 3.3.2 The nearest watercourse is an unnamed land drain (Ordinary Watercourse) which flows through the site in an easterly direction.
- 3.3.3 Based on a review of the Environment Agency's flood map (Figure 1) and SFRA mapping the Site is located within Flood Zone 1; outside the extent of the 1 in 1,000 year (0.1% AEP) risk of fluvial flooding. The Site is therefore considered to be at 'low' risk of fluvial flooding.
- 3.3.4 Based on information provided by the SFRA, there have been no past flooding events within the Site boundary.

**Figure 1 Environment Agency Flood Map for Planning, August 2015**



### Tidal Flooding Sources

- 3.3.5 The Site is not at tidal flood risk by reason of elevation and distance from any tidally affected watercourses.

### Flooding from rising / high groundwater

- 3.3.6 Water is present in the sands and gravels of the buried palaeochannel and any groundwater flooding within the excavation will be mitigated to a low and acceptable level as part of a groundwater management strategy for the Site.



Surface water flooding

- 3.3.7 The Environment Agency online mapping shows the majority of the Site has a very low risk of surface water flooding. However there are small areas across the Site with a low to high risk of surface water flooding associated with field ditches.
- 3.3.8 The majority of the Site is at low risk of surface water flooding. Residual flood risk from this source will be further mitigated to a low and acceptable level by the adoption of a surface water management strategy for the quarry.

Flooding from Infrastructure Failure

- 3.3.9 Based on the Environment Agency online Flood Maps, the Site is located outside the extent of flooding sourced from reservoirs. The risk of flooding from reservoirs is considered low.

Impacts on off -site receptors

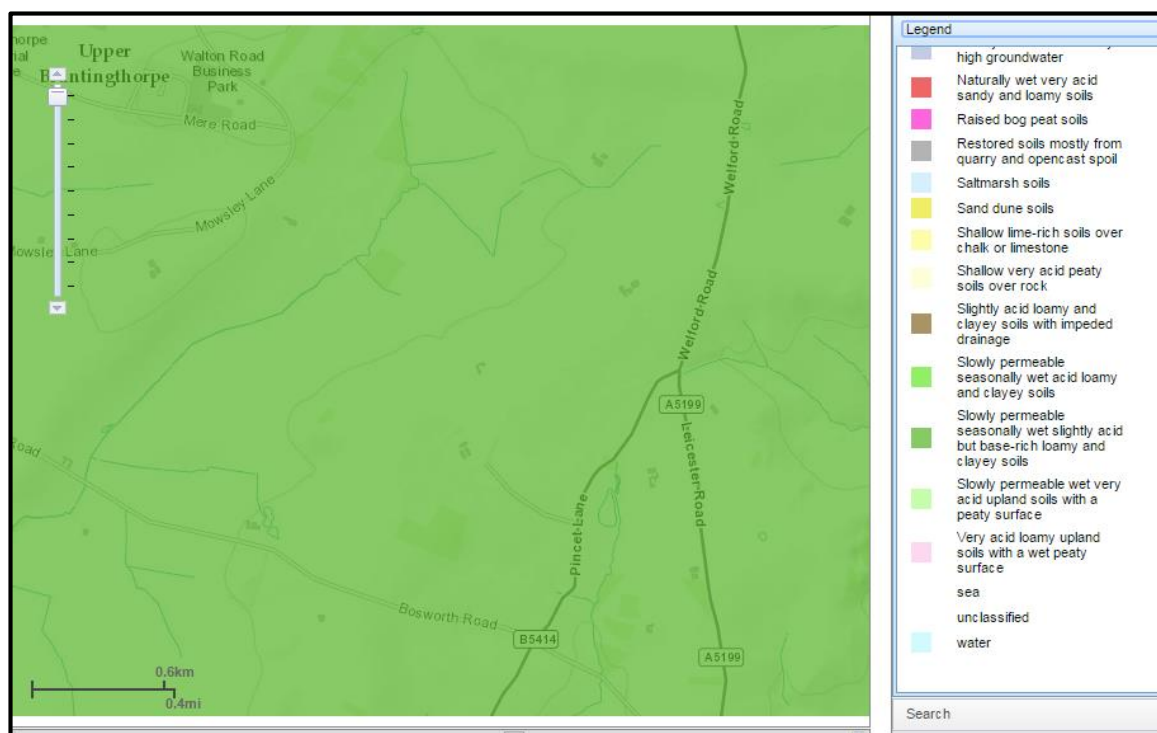
- 3.3.10 Historical Information on the historic Public Water Supplies indicates that their groundwater was obtained primarily from confined water bearing strata within the Lias bedrock and that groundwater abstraction from the superficial sands and gravels was minimal.
- 3.3.11 Any runoff from the site will be attenuated to the greenfield runoff rate as part of surface water mitigation measures.

## 4.0 Soils, Geology and Hydrogeology

### 4.1 Soils

- 4.1.1 Soils mapping produced by the National Soils Resources Institute (Cranfield University) shows that the Site is underlain by slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (see Figure 2). The existence of ponds on historical mapping indicates that the soil drainage is poor. More detailed information on soils is included within the soil resources and agricultural quality report 1144/1 by Land Research Associates Ltd August 2015.
- 4.1.2 Recharge of the sands and gravels within the superficial deposits is likely to be low due to the restricted permeability of the confining soils and clayey subsoils.

**Figure 2: Soils Mapping Extract**



### 4.2 Geology

- 4.2.1 Geological Survey (BGS) 1:50 000 digital geological mapping shows that the soils are underlain by superficial deposits of glacial till. The bedrock beneath the south east of the Site is Jurassic-aged Lias and Charmouth Mudstone. To the north west of the Site the geology is Dyrham Formation siltstones and mudstones.
- 4.2.2 The site geology based on available published information is summarised in Table 2 below.

**Table 2: Summary Geology: Pincet Lane**

Age	Lithology	Description
Quaternary Superficial Deposits	Top soil	Clayey loam ~0.6m thick
	Upper Till	Firm brown-grey clay, common angular chalk and flint fragments averaging 3.4 m thickness
	Sand and Gravel	Sand; Medium to Coarse average 25% silt Gravel: limestone, chalk, flint, chert, sandstone, ironstone 15m average thickness. Several clay bands
	Basal Superficial clay	Brown still clay, laterally impersistent
Jurassic Bedrock	Middle Liassic	Typically blue grey stiff clays and siltstones with increasing silt content towards base. Basal section of unit contains occasional limestone, marl and shale bands. Uppermost beds not represented at Site.
	Lower Liassic	Blue grey stiff clays without silt below top few metres contain discrete thin ironstone and limestone bands

4.2.3 The bedrock dips SSE from 148.5mAOD in the northeast corner of Walton Holt Gorse on the western boundary of the site to around 141.5mAOD in the south east corner of site adjacent to Bosworth road. The regional dip is 0.01 to the SSE.

4.2.4 The quaternary superficial deposits are the economic mineral to be extracted by the proposed development. The sands and gravels are deposits emplaced as an infill within a buried palaeochannel. The channel was excavated by the action of glaciers or glacial meltwater. According to the BGS mapping the majority of these quaternary deposits consist of boulder clay at surface except where erosion has removed the clays. Superficial deposits increase in depth where channels are incised into the underlying Lias and consist predominantly of sand and gravel.

### 4.3 Groundwater

4.3.1 The permeability of the bedrock is recorded as being variable (low to moderate) with a Secondary A aquifer located on site. This is associated with more permeable limestone units within the Lias clays

4.3.2 Recharge of the sands and gravels from infiltrating runoff is considered to be low, due to the heavy clay soils over slowly permeable confining subsoils. Consequently while the sands and gravels are permeable, the flux of groundwater through them is considered likely to be low.

4.3.3 It is noted that the south eastern corner of the Site lies within a Groundwater Source Protection Zone 3 – total catchment associated with an historical Public Water Supply. Historical records indicate that the boreholes are located in the Lias bedrock but used the overlying sands and gravels for temporary storage (Barlow 1936).

## 5.0 References

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Barlow J.G. 1936. Market Harborough Water Supply and Recent Extensions Thereto. *Proc. Inst. Municipal and County Engineers* **62**, 500-513

MAFF 1975. *Climate and Drainage, Technical Bulletin 34*, Ministry of Agriculture, Fisheries and Food, December 1975, London, HMSO



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