
Watlington Quarry — Environmental Setting and Site Design

A117209
November 2021

PRESENTED TO

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W8/1/19/05-09 – Working Scheme

W8/1/19/04 – Restoration Proposals

1.0 INTRODUCTION

1.1 REPORT CONTEXT

- 1.1.1 This section of the Environmental Permit application corresponds to Question 1, Appendix 4 of Part B4 of the Environmental Permit application form, which requires the provision of an Environmental Setting and Site Design (ESSD) report.
- 1.1.2 The aim of this report is to describe the regulated facility in relation to the environmental setting, identifying the source terms, pathways and receptors that will be used as the basis for the risk assessments, including;
- Hydrogeological Risk Assessment (HRA);
 - Landfill Gas Screening Report; and
 - Environmental Risk Assessment (ERA)
- 1.1.3 This Environmental Permit application has been prepared on behalf of the operator, Mick George Limited (Mick George), by Tetra Tech.

1.2 REGULATED FACILITY DETAILS

Site Location

- 1.2.1 The application site forms part of the wider Watlington Quarry site in Norfolk and is located approximately 1.5km north east from the village of Watlington. The site is centred at approximate National Grid Reference (NGR) TF 63427 11556 and the environmental permit boundary is shown on Drawing Number MGL/A117209/PER/01.

Site Classification

- 1.2.2 The regulated facility is an inert landfill.

Site Context

- 1.2.3 Access to the site is achieved from an access road off Watlington Road located to the north of the site.
- 1.2.4 Beyond the wider quarry site, the immediate surroundings are agricultural and the nearest residential property is considered to be Oak House which is located approximately 575m north of the application site.

Compliance with Environment Agency position statement on the location of landfills

- 1.2.5 With reference to the Multi Agency Geographic Information for the Countryside's (MAGIC) website under

the Groundwater Vulnerability Map, the site is situated within an area of Minor medium- low vulnerability but does not lie in a Groundwater Source protection Zone. In terms of aquifers, the MAGIC website shows that the site doesn't overlie an aquifer in bedrock however it does overlie a secondary A aquifer in the superficial deposits. Secondary A aquifers are defined as having permeable layers that are capable of supporting water supplies at a local rather than strategic scale, and in some cases forms an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

- 1.2.6 With reference to The Environment Agency's Approach to Groundwater Protection guidance (published February 2018), any proposed landfill will be objected to if the site is situated within an GSPZ 1 or within a Principal Aquifer.
- 1.2.7 As noted above, the site is not within a Groundwater Source Protection Zone however it does overlie a secondary A aquifer in the superficial deposits.
- 1.2.8 The HRA and ERA (Appendices H and C of the Environmental Permit Application) that have been undertaken for the proposed activity show that the waste disposal activities at the site do not pose a potential hazard to groundwater quality.
- 1.2.9 The environmental risk assessments of the Environmental Permit Application demonstrate that long-term site management will not be required due to the environmental protection measures and waste acceptance protocols proposed for the development.

2.0 SOURCE TERM CHARACTERISATION

2.1 THE DEVELOPMENT OF THE INSTALLATION

Historical Development

- 2.1.1 Watlington Quarry has been an active site for the production of sand and gravel, and aggregate since the first planning permission was issued in the mid 1960's and since then a number of planning permissions for extensions to the site have been granted.
- 2.1.2 Permission reference C/2/2000/2022 was granted by Norfolk County Council (NCC) on 03/06/2003 for the extension of sand and gravel extraction with progressive restoration to nature conservation and agriculture, the erection of a new processing plant and retention of existing access.
- 2.1.3 Permission reference C/2/2011/2023 was granted by NCC on 21/08/2012 a variation of condition 8 of planning permission C/2/2000/2022 to enable the phased extraction of the remaining reserves in accordance with a new phasing plan.
- 2.1.4 Permission reference C/2/2015/2007 was granted by NCC on 04/11/2015 a variation of conditions 1 and 3 of planning permission C/2/2011/2023 to allow continued use of plant site until 1 August 2020, to service the proposed quarry extension (MIN 75).
- 2.1.5 Planning permission C/2/2015/2006 was granted by NCC on 04/11/2015 to enable an extension to quarry (MIN 75) with installation of ground conveyor with culvert to accommodate the conveyor.
- 2.1.6 Planning permission C/2/2018/2001 was granted by NCC on 18/04/2019 to enable an extension to the Quarry with contained use of the ground conveyor (part), culvert and service track.
- 2.1.7 Planning permission C/2/2018/2002 was granted by NCC on 18/04/2019 enabled a variation of conditions 1,3 and 18 of planning permission C/2/2015/2007 to extend the time period for restoration of sixty acre field and allow continued use of plant site to service proposed quarry extension (MIN 76) until 31 December 2023.
- 2.1.8 Planning permission C/2/2018/2024 was granted by NCC on 06/08/2019 to enable the construction of additional silt lagoon and subsequent removal of sand and gravel and clay – amended description of proposal.

Proposed Development

- 2.1.9 In 2021, planning permission (reference FUL/2021/0007) was granted by NCC to allow the extraction of

sand, gravel and clay with subsequent restoration in an area to the south of the existing quarry site (as outlined on Drawing Number MGL/A117209/PER/01).

- 2.1.10 As part of the restoration works, Mick George seeks to utilise imported inert waste materials rather than 'virgin soils'. As such, the proposal entails the importation of inert waste to infill and progressively restore the quarry void that will be created following mineral extraction activities.

Proposed Operational Phasing

- 2.1.11 The proposed phasing plan is detailed in a series of drawings in drawing number W8/1/19/05-09 – Working Plan As detailed in these plans, the site will comprise five phases (Phase 1, 2, 3, 4 and 5) which will proceed from north to south.

Permitted Waste Types and Quantities

- 2.1.12 Permitted wastes accepted at the site will be strictly inert as classified under the Landfill Directive (1999/31/EC) and Council Decision (2003/33/EC) of 19 December 2002 'establishing criteria and procedures for the acceptance of waste landfills'.
- 2.1.13 Details regarding the proposed waste types including restrictions are provided in the Operating Techniques (Appendix B of the Environmental Permit Application).
- 2.1.14 The restoration of the site will require approximately 800,000m³ of material to be brought on to the site. When using a bulk conversion factor of 1.6 tonnes/m³ this equates to 1,280,000 tonnes. It is proposed that approximately 250,000m³ (or 400,000 tonnes) of material would be imported to the site per annum.

Landform and After Use

- 2.1.15 As detailed on the restoration scheme (Drawing Number W8/1/19/04) the site will be restored to high quality agricultural land (at pre-development levels) whilst additionally creating alternative habitats in line biodiversity action plan objectives.

3.0 PATHWAY AND RECEPTOR TERM CHARACTERISATION

3.1 CLIMATE

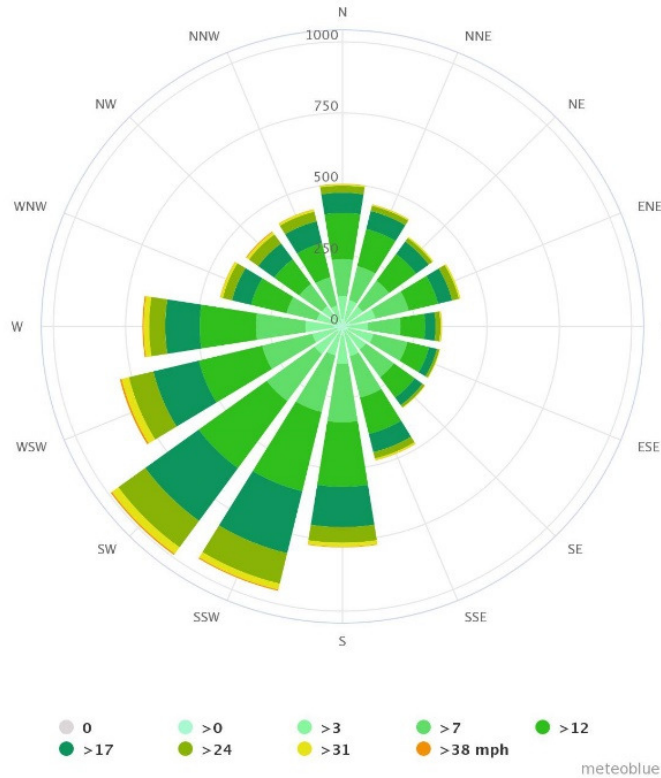
3.1.1 Rainfall data is available from a rain gauge at Marham, located approximately 10.5km south east of the site (NGR: TF 73880 09016) shown on the Met Office website (Met Office, 2020) from 1981 to 2010 with average monthly rainfall summarised in Table 1 below.

Table 1: Monthly Rainfall Data from Marham (1981 - 2010)

Month	Average Rainfall mm (1981 – 2010)
January	56.1
February	39.3
March	49.1
April	47.2
May	53.3
June	59.2
July	52.1
August	58.8
September	55.3
October	67.3
November	62.2
December	52.7
Annual (Average)	652.5

3.1.2 The wind rose data, based on findings recorded at Tottenhill located approximately 450m South east of the site (NGR: TF 63721 11114) taken from www.meteoblue.com, shows that the prevailing wind direction is from the south west (SW) (see Figure 1). The prevailing wind direction is shown on Drawing Number MGL/A117209/REC/01.

Figure 1: Wind Direction Recordings at Tottenhill



3.2 GEOLOGY

3.2.1 The sites Geology comprises Tottenhill Gravels (superficial) overlying Kimmeridge Clay (bedrock). There is alluvium to the west of the site near Spring Pit. To the south and East of the site, the Tottenhill Gravels and Nar Valley Deposits give way to Diamicton (Glacial Till) to the south and the Sandringham Sand formation in the east.

3.2.2 The British Geological Survey (BGS) describes the Tottenhill Gravel Member as a complex sequence of sands and gravels, dominated by flint. There is a sharp lithological change between the Tottenhill Gravels and the Kimmeridge Clay Formation. The Kimmeridge Clay Formation comprises dark brown-grey to black, organic rich, fissile mudstone with occasional hard, thin carbonate-cemented horizons.

3.3 HYDROLOGY

3.3.1 According to the Flood Map for Planning Service (FMPS) and the Amber Planning Flood Risk Assessment produced, the is located in Flood Zone 1 which has a low probability of flooding.

3.3.2 The site is located 1.4km south of the River Nar within the River Nar valley. The surface water features, and groundwater elevation are controlled by the artificial drainage channels which all ultimately drain to the Polver Drain, via Hobbs Drain to the north. The site itself and the low-lying area surrounding the site falls within the Inland Drainage Board (IDB) area of the East of Ouse, Polver and Nar IDB. Hobb's Drain, is located approximately 400m northwest of the site and drains a substantial catchment to the west of the site and is set in a shallow valley. Hobb's Drain flows northwards to join the Polver Drain which, in turn, flows eastwards to join with the River Great Ouse.

3.4 HYDROGEOLOGY

3.4.1 The Kimmeridge Clay and the Nar Valley sediments to the north of the site are classified as Unproductive Strata. The Tottenhill Gravels and the Sandringham Sands Formation are classified as Secondary A and Principal Aquifers respectively. The site is not located within a source protection zone (SPZ), the closest of which is associated with the West Melbury Marly chalk abstraction some 8.8km to the east at Narborough. These abstraction points are physically and hydrogeologically separate from the gravel deposits.

3.5 RECEPTORS AND COMPLIANCE POINTS

3.5.1 The principal receptor is considered to be the groundwater within the Tottenhill Gravels and the Sandringham Sands Formation (superficial deposits). However, these are being extracted as part of the quarrying operations.

Surface Water

3.5.2 The surface water features, and groundwater elevation are controlled by the artificial drainage channels which all ultimately drain to the Polver Drain, via Hobbs Drain. The site itself and the low-lying area surrounding the site falls within the Inland Drainage Board (IDB) area of the East of Ouse, Polver and Nar IDB.

3.5.3 There are active abstraction and discharge permits for this site under Reference No's AN-033-0056-020 and KB3791WH which detail the compliance limits needed for discharge from the site.

Amenity and Ecology

3.5.4 The receptors identified in Table 2 of the Environmental Risk Assessment (Appendix C of the Environmental Permit Application), have been considered in the Environmental Risk Assessment.

4.0 POLLUTION CONTROL MEASURES

4.1 SITE ENGINEERING

Basal Engineering

- 4.1.1 No mineral liner is required to be constructed for the site due to the presence of a natural geological barrier present at the base comprising of Kimmeridge Clay. Therefore, the geological barrier will be formed by leaving the existing clays in place.

Side Slope Engineering

- 4.1.2 A clay side slope liner will be constructed from excavated site derived clay or suitable waste materials. The liner will have a horizontal crest width of 2m from the edge of the site and be constructed at a slope of 1 in 3. The engineered clay liner will have a thickness of 0.5m perpendicular to the side slope with a hydraulic conductivity of 5.0×10^{-8} m/s or the equivalent.
- 4.1.3 The proposed construction of the clay liner would be to the specification detailed in the Construction Quality Assurance (CQA) Plan that will be submitted to the Agency for approval prior to engineering taking place. See the Hydrogeological Risk Assessment for further details.

Capping

- 4.1.4 In accordance with the requirements of the Landfill Directive, an engineered cap (clay or plastic) is not required. On completion of filling to final levels, the site will be capped with 1m of restoration soils comprising not less than 0.3m of topsoil.

4.2 LEACHATE MANAGEMENT AND MONITORING

Leachate Generation

- 4.2.1 Leachate is generated by rainfall infiltrating through areas of open waste and also through areas of restored waste. Due to the inert nature of the waste, it is considered that the generation of leachate is highly unlikely and therefore no leachate management or monitoring is proposed.

4.3 GAS MANAGEMENT AND MONITORING INFRASTRUCTURE

Gas Generation

- 4.3.1 A Gas Risk Assessment (GRA) has not been prepared for the infilling of the Watlington Quarry site, as the Landfill Technical Guidance Note LFTGN03 indicates that new inert landfills do not pose a landfill gas

hazard.

- 4.3.2 A Landfill Gas Screening Report has been prepared which has been submitted with the Environmental Permit application as Appendix J. In waste gas monitoring boreholes will be installed following the completion of each phase in order to monitor the levels of gas produced by the waste mass in accordance with the requirements of the Environment Agency's guidance note on inert landfills. The location of the in waste gas monitoring boreholes is provided on Drawing Number MGL-A117209-MON-01.
- 4.3.3 Further details regarding the monitoring of landfill gas is provided in the Environmental Management and Monitoring Plan (Appendix K of the Environmental Permit Application).

4.4 SURFACE WATER MANAGEMENT SYSTEM

- 4.4.1 The surface water features, and groundwater elevation are controlled by the artificial drainage channels which all ultimately drain to the Polver Drain, via Hobbs Drain. The site itself and the low-lying area surrounding the site falls within the Inland Drainage Board (IDB) area of the East of Ouse, Polver and Nar IDB.
- 4.4.2 There are active abstraction and discharge permits for this site under Reference No's AN-033-0056-020 and KB3791WH which detail the compliance limits needed for discharge from the site.
- 4.4.3 A flood risk assessment has been produced by Amber Planning for the planning application which states:-

"The restored landform will be contoured to convey runoff to perimeter swales via overland flow, which will discharge into a detention pond downstream.

The attenuation facility is designed to be dry under normal conditions becoming operational only following periods intense rainfall or storm activity. Capacity is present to accommodate rainfall events up to and including the 100 year storm, accounting for climate change at 40% and without surcharge. The outer banks of the pond will be elevated (>300mm) relative to the inboard banks to retain surcharged runoff within on-site areas and to redirect it back into the surface water management systems.

The perimeter swales have been sized to accommodate runoff for return period rainfall events up to and including the 100 year storm, including climate change and without surcharge. The outer bank of the swales will be elevated (>300mm) relative to the inboard bank to contain runoff within the site and to direct water towards the attenuation facility via overland flowpaths. An emergency spill unit will be located on the swale headwall at the pond inlet to encourage overland flows to enter the pond via exceedance routes, and to direct runoff back into the main site in the event of surcharge of either the detention pond or upstream drainage network.

A 300mm freeboard will be provided above the maximum water level to account for seasonal variations in rainfall, successive storms and losses in storage associated with siltation."

4.5 POST CLOSURE CONTROLS

- 4.5.1 The post closure controls will ensure long-term management and monitoring of the regulated facility.
- 4.5.2 The Environmental Management and Monitoring Plan (Appendix I of the Environmental Permit Application) provides details regarding the monitoring schedule of the aftercare phase.
- 4.5.3 The Closure and Aftercare Plan (Appendix K of the Environmental Permit Application) provides details of the measures to be taken upon and after the closure of the landfill to avoid pollution risk.

5.0 SITE CONDITION REPORT

- 5.0.1 The Environmental Permitting Regulations – Site Condition Report (H5) states that a Site Condition Report (SCR) is 'not applicable to those parts of a permitted activity that have permanent deposits of waste', however is also states: 'and SCR is necessary for areas of the permitted site where you have not deposited any wastes (e.g. site access areas, site offices, weighbridge, wheel cleaning facilities, etc.)'. As such a SCR has been prepared and is given in Appendix G of this application.

DRAWINGS

MGL/A117209/PER/01 – Site Location and Environmental Permit Boundary

W8/1/19/05-09 – Working Scheme

W8/1/19/04 – Restoration Proposals