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INTRODUCTION

3.1 Under Regulation 18(4)(b) of the EIA Regulations (see Appendix 1-1) an ES should provide a as a minimum "*a description of the proposed development comprising information on the site, design, size and other relevant features of the development*". Schedule 4 indicates that, where relevant, the ES should provide a description of the development, including in particular:

- a description of the location of the development;
- a description of the physical characteristics of the whole development;
- a description of the main characteristics of the operational phase of the development
- an estimate of expected residues and emissions and quantities and types of waste produced during the construction and operation phases.

3.2 In addition, it is normal practice for planning applications for mineral development to be accompanied by a supporting statement that describes, inter alia, the development proposals. As such, there is an overlap in the requirements of an ES and what is considered good practice for the submission of planning applications. Accordingly, Volume 1 (Planning Statement) also includes a description of the development. This chapter sets the basis against which the EIA has been conducted.

OVERVIEW OF THE DEVELOPMENT PROPOSALS

3.3 The applicant is re-submitting a planning application for the establishment of a new quarry on land at the former Hatfield Aerodrome, being part of the allocated site referred to in the extant Minerals Local Plan ("*Preferred Area 1*", and illustrated on Inset Map 6 - refer to Chapter 4 below for further information). The proposals would involve the winning and working, together with processing for sale, of some 8Mt of sand and gravel over a period of around 30 years (based on an annual output of around 250,000tpa). In parallel with the extraction of minerals would be the importation of low permeability inert material to infill the mineral workings to facilitate the restoration of the site to a beneficial after use, combining recreation and nature consideration. The imported material would typically comprise excavation wastes from construction and engineering projects (soils, overburden, clays etc.) within the region.

3.4 In view of the recent refusal to grant planning permission, the applicant has amended the scheme as follows:

- the erection and operation of a concrete batching plant has been removed from the proposals;
- the standoff for mineral extraction operations in the Lower Mineral Horizon (LMH) to the bromate plume (also in the LMH) has been increased from 50m to 100m;
- there will be no dewatering (pumping) of the LMH; and
- The access road from the quarry entrance has been moved by 5m to the east to allow additional acoustic screening.

3.5 The quarry would be worked on a phased basis to allow for progressive restoration; this minimises the amount of land taken at any one time. Sand and gravel would be worked from two discrete horizons; the Upper Mineral Horizon ('UMH'), which lies predominantly above the water table, would be worked dry whilst the Lower Mineral Horizon ('LMH') would be worked wet (i.e. no dewatering of the workings). Above the UMH is a clayey material (referred to as '*overburden*') on top of which is the soil horizon. The two mineral horizons are separated by a laterally continuous layer of boulder clay (referred to as '*interburden*'): the overburden and interburden would be used to control groundwater ingress and to infill the base of the workings to provide a suitable low permeability geological barrier on top of which the imported material would be placed.

3.6 Excavated material would be processed at the quarry using a combination of screening and washing plant to produce a range of graded aggregates and sands. Processed aggregates would be dispatched from the site in HGVs via a new access constructed onto the A1057 (Hatfield Road) on the southern side of the quarry.

3.7 Other ancillary development would include a weighbridge, office accommodation, electrical transformer, electrical switch-room, and small stores and maintenance building, fresh water and silt lagoons.

3.8 In order to demonstrate the acceptability of the development proposals, a comprehensive development scheme has been prepared and is described in this chapter. The scheme addresses the establishment, phased operation and restoration of the quarry together with detailing the ancillary infrastructure needed to support the operation. The development has been designed to ensure that the potential environmental impacts are avoided or minimised. This underlines the applicant's intentions and responsibilities to conduct its activities as a responsible neighbour and in a manner which is sympathetic to local amenity and causes minimal disruption to the local community. The mitigation measures identified as being necessary during the course of the EIA form part of the development proposals. In preparing the working scheme, consideration has been given to the following:

- proximity of dwellings (existing and proposed) and the likely environmental impacts in terms of noise and air quality;
- archaeological considerations
- ecological considerations;
- visual and landscape impact;
- hydrology and hydrogeology; and
- traffic generation and movements

3.9 The proposed development of the site is illustrated in Drawing Nos. HQ3/1 to HQ3/16 as follows:

- HQ 3/1 shows the overall phasing / general layout of the quarry;
- HQ 3/2 shows the entrance design;

- HQ 3/3 shows the plant site (masterplan);
- HQ 3/4 shows the plant site layout (detail);
- HQ 3/5 shows the elevations of the processing plant;
- HQ 3/6 shows the advanced works (planting);
- HQ 3/7 shows the initial site preparation works;
- HQ 3/8 shows development within Phase A;
- HQ 3/9 shows development within Phase B;
- HQ 3/10 shows development within Phase C;
- HQ 3/11 shows development within Phase D;
- HQ 3/12 shows development within Phase E;
- HQ 3/13 shows development within Phase F;
- HQ 3/14 shows development within Phase G;
- HQ 3/15 illustrates the final restoration masterplan;
- HQ 3/16 provides illustrative cross sections.

GENERAL ARRANGEMENT

3.10 The new quarry would comprise the following key elements:

- new access onto the public highway and internal hard surfaced access road (which has been moved 5m to the east from the previous proposed alignment) between the entrance and plant site;
- weighbridge and office located to the north of the new site entrance;
- plant site including processing plant, stockpiles, office and other ancillary facilities;
- peripheral screening mounds;
- infiltration lagoon; and
- mineral extraction area divided into 7 phases.

3.11 **Drawing HQ 3/1** illustrates the overall layout of the proposed quarry.

CONSTRUCTION PHASE

3.12 Initial developments associate with the establishment of the quarry would involve the following operations:

- establishment of a new site access onto A1057 and construction of internal roadways linking the access to the plant site;
- creation of mitigation ponds/habitat for translocation of great crested newts;
- stripping of soil resources from operational areas, including plant site, fresh water/silt lagoons, haul roads and initial phase of mineral extraction;
- placement of soils into screen mounds located on the periphery of the site;
- undertaking initial landscaping works, including advance planting around Popefield Farm;
- creation of temporary permissive paths within the site to retain areas for public access;
- erection of processing plant and ancillary facilities;
- excavation of freshwater and silt lagoons; and
- excavation of a recharge lagoon within the UMH.

Site Access

3.13 A new entrance off the A1057 (which runs on the southern boundary of the application site) would be constructed close to the south western corner of the application site at NGR TL 198078.

3.14 The site access is designed with a carriageway width of 8m which forms a simple priority junction with the A1057. The junction would have 15m entry and exit kerb radii and a 1 in 12 taper, designed in order to comfortably accommodate all vehicle requirements. The internal access bends would also have a centreline radius of 20m to accommodate the necessary HGV swept-paths.

3.15 From the site entrance, the internal road would be constructed from concrete (or bituminous bound material, 'asphalt') up to the plant site. At the start of the hard surfaced access road within the plant site would be a wheel wash. Approximately 200m from the site entrance would be two surface mounted weighbridges (with attendant office) along with bypass lanes and a turning area for any vehicles refused access to the site.

3.16 In order to accommodate the entrance and associated visibility splay a section of the hedgerow that bounds the site/A1057 would need to be cleared. This would be undertaken outside of the bird breeding season (taken as being March to August).

3.17 As noted above, soils would be stripped from the footprint of the site entrance and internal access road. These soils would be placed into storage mounds located on the periphery of the site, in the vicinity of the site entrance. The line of the access road follows the western edge of the extraction area, lying at least 10m to the east of a National Grid gas main. On the western edge of the access road a new drainage ditch would be cut to intercept surface water. Allied to this, a 3m high acoustic fence would be constructed to the west of the access road.

3.18 A new fence would be erected behind the line of the visibility splay, behind which would be planted a double row of hedgerow plants. In view of the need to deter unauthorised access into the site, the fence would be post and rail, with barbed wire on top.

3.19 Two sets of gates would be installed on the access road; the first would be at the site entrance (set back from the junction) with the second located on the south side of the weighbridge area.

3.20 These details are illustrated on **Drawing HQ 3/2** and also considered further in Chapter 7 of this ES, including Drawing HQ 7/1.

Plant Site

3.21 The plant site would be located to the north of the mineral extraction area and west of Home Covert (woodland), covering an area of around 11ha. The main items within the plant site would be the aggregate processing plant; stockpile of as-dug material (surge pile); aggregate stockpiles; site office/administration building; fresh water lagoon and a small silt lagoon.

3.22 Prior to commencement of the construction of the processing plant, the Nast would be diverted to a new line around northern and eastern edge of the application site. The Nast is understood to be ephemeral and have low flows of surface water.

3.23 Soils would be stripped to a depth of around 1m from the footprint of the plant site and placed into storage mounds located to the north, east and west of the plant site. As dug sand and gravel excavated from the infiltration lagoons (see below) would be used to raise levels within the plant site by around 0.5m above original ground levels.

3.24 The processing plant would be a conventional static design (as opposed to an arrangement of mobile plant) and comprise the following elements:

- feed hopper;
- primary screen;
- washing plant and main screens;
- cone crusher;
- sand plant.

3.25 **Drawing HQ3/3** shows the layout of the plant site, whilst **Drawing HQ3/4** illustrates the layout of the processing plant in more detail. **Drawing HQ 3/5** shows the elevations of the processing plant.

3.26 Ancillary to the processing would be an electrical transformer, electrical switch-room, and small stores and maintenance building. These would all be constructed from block work.

3.27 The office and welfare accommodation would be four 'portacabin' style temporary buildings. These would be used as sanitary and drying facilities, mess room, site offices and meeting room/s.

Recharge Lagoons

3.28 Although the applicant would not abstract groundwater from the LMH, it is proposed to retain both the UMH and LMH groundwater infiltration lagoons as previously designed and presented. The UML would be the primary UMH groundwater infiltration location, but it would be connected to the

adjacent LML at a high level because it makes operational sense to have the facility and option to discharge excess UMH groundwater should the need arise.

3.29 For the UML, soils would be stripped from the footprint of the lagoon (together with a narrow strip along the western and southern boundaries) and placed into storage mounds located on the periphery of the application site. Overburden would then be stripped and the underlying UMH extracted from the footprint of the lagoon: overburden would be used to form the peripheral 'seal' and ultimately internal walls to the lagoon on 3 sides, with surplus overburden material used to form the peripheral screen mounds.

3.30 For the LML, the same process would follow that described in paragraph 3.29 above, apart from the eastern lagoon boundary being fully sealed down to the upper surface of the interburden, meaning groundwater from the UMH can be dewatered within the perimeter of the LML. The excavation can then continue downward through the interburden until it exposes the surface of the LMH, at which point the excavation would stop. A manually operated high level spill-over would link the two lagoons to allow the flow of UMH groundwater into the LML. At no time would LMH groundwater flow into the UML because the water level in the LMH is over 5m lower than groundwater in the UMH.

Soil and Overburden Stripping

3.31 The sand and gravel deposit is overlain by a layer of overburden, subsoil and topsoil which varies in depth across the site. Soil stripping would be undertaken on a campaign basis (i.e. for a concentrated period lasting several weeks, as opposed to constantly throughout the year).

3.32 The soil and overburden would be stripped using a hydraulic excavator and transported across the site to the storage locations in articulated dump trucks. Soils would only be moved when they are dry and friable in order to ensure that their structures are not compromised. All soil stripping, handling and storage operations would be carried out in accordance with MAFF's Good Practice Guide for Handling Soils, published in 2000. The key points being as follows:

- no topsoil shall be removed from the site;
- topsoil, subsoil and overburden would be stripped separately;
- all soils would be handled when in a dry and friable condition by monitoring the lower plastic limit before works commence;
- topsoil, subsoil and overburden would be stored "like on like", so that for example, overburden storage areas would be stripped of soils in advance;
- loose-tipping and grading of soil materials, to specified restoration profiles, would be carried out using tracked excavator or low ground pressure bulldozer;
- no heavy wheeled earthmoving vehicles or machines to run over un-stripped or replaced soils to minimise compaction;
- following mechanical de-compaction, all stones and rocks exceeding 0.15m in any dimension and other deleterious material would be removed from the topsoil; and
- soils would be placed early enough in the year to allow grassland vegetation to be established before the winter and reduce the risk of erosion.

3.33 All topsoil stripping and other site preparation works that involve ground disturbance would be carried out with due regard to the scheme of archaeological investigation which would be agreed with the MPA.

3.34 Stripped soils would be placed into storage mounds located around the periphery of the application site. In line with best practice these would have a maximum height of 3m (to avoid compaction) compared to the 4m-5m proposed for overburden storage mounds. The outer slops of the storage mounds would have a gradient of 1:3 along the frontage to Hatfield Road, the playing fields, and adjacent to the public footpath, with gradient of 1:2 elsewhere.

3.35 **Drawing HQ 3/7** shows the areas from where soils would initially be stripped, the volumes arising and where this material would be stored.

Translocation of Great Crested Newts and Badger

3.36 As set out in Chapter 11 of this volume, Great Crested Newts have been identified in four ponds within the application site. Two of these ponds are located between the recharge lagoon and Home Covert and thus the design of the scheme seeks to avoid any disturbance to these ponds. Works would though be undertaken in close proximity, and thus a scheme of exclusion would be needed to ensure that areas to be stripped were clear of the species.

3.37 Two other ponds, located to the south of the Nast lie within the development footprint of the plant site/extraction area within Phase C. Both of these ponds would be lost to the development and thus a scheme of mitigation would be required: this would involve the creation of new ponds, (on a two for one replacement ratio) and habitat. The precise detail of the mitigation scheme would be set out in an application for a European Protected Species Licence submitted to Natural England. As part of the initial works, a scheme of exclusion would be needed.

3.38 Similarly, as identified in chapter 11, a single badger sett would need to be relocated; again the precise detail of the mitigation scheme would be set out in an application for a European Protected Species Licence submitted to Natural England.

OPERATIONAL PHASE

Overview

3.39 It is proposed to develop the mineral deposit on a phased 'cellular' basis, whereby the workings advance in a general westerly direction with progressive restoration following behind. As noted above, the phasing of the workings is illustrated on **Drawing HQ 3/1**. Each phase is anticipated to sustain production for around four years and sand and gravel would be extracted from both mineral horizons. The UMH would be progressively worked across each phase to its full depth to expose the interburden horizon, and removal of the interburden would take place in a series of smaller 'cells' to allow extraction of underlying mineral from the LMH once the UMH above each area of interburden has been removed. The depth of LMH extraction would be equivalent to the volume of acceptable site derived barrier and restoration material but at no time would it extend below 1m above the Chalk surface.

3.40 The UMH would be sealed at the perimeter of each phase with a low permeability bund wall keyed into the interburden and equipped with a back-wall drainage system. This would prevent further UMH groundwater flow into each phase. Once sealed remaining groundwater within the UMH would be pumped to the UMH recharge lagoon. The LMH layer would be excavated 'wet' (beneath water).

3.41 Following completion of mineral extraction from each LMH cell, suitable overburden and interburden (from the site) would be placed into the base of the workings to raise the operating level to above the level of the groundwater in the LMH, at which point an engineered thickness of barrier material would be installed and keyed into the surrounding interburden or previously engineered barrier material. The remaining void would be infilled with suitable onsite and imported inert restoration material.

3.42 Each phase would be worked in a similar fashion and thus a description is provided for Phase A, which is located in the south eastern corner of the application site, and this is indicative of the approach that would be taken for all later phases. As noted above, a set of drawings have been provided to show the progression of working and restoration through the seven phases.

Phase Preparation – Phase A

3.43 Each phase would be divided into sub-phases based on providing a working area capable of sustaining production for between 18 and 24 months to allow for fluctuations in market demand. Vegetation would be cleared from the initial sub-phase followed by the stripping of soils (again incorporating a narrow strip from the adjoining phase to the north to allow the construction of a cell wall). Stripped soils would be placed into storage mounds (3m in height) located on the periphery of the working area, extending the bunds previously created as part of the site preparation works adjacent to Hatfield Road. Overburden would be excavated, initially from a strip around the periphery of the phase to allow for the creation of the back-wall drainage system and placement of low permeability seal. The edge of the phase would be cut to a 1:1 slope, with the low permeability material placed in an engineered fashion to create a slope of 1:3. It is proposed to use overburden for the peripheral seal; however, should suitable clay be available for importation then this would also be imported into the site. Any surplus overburden would be used directly, or temporarily stockpiled in the working area pending placement, within the base of the mineral void following extraction of the LMH (see below).

Mineral Extraction – Phase A

3.44 The development of Phase A is illustrated on **Drawing HQ 3/8**. In view of the two mineral horizons the UMH needs to be worked first to expose a suitable area of the interburden to provide safe access to the LMH. The UMH would be worked in a conventional manner, and in a similar fashion to the recharge lagoon described above. The UMH would be partially saturated to varying degrees dependent upon phase location and season, so dewatering would be necessary using a combination of drains and pumps, with extracted water pumped to the UMH recharge lagoon.

3.45 The UMH would be excavated using a 30t or 40t hydraulic excavator, which would load the as-dug mineral onto an articulated dump truck for transport to the as-dug stockpile located on the eastern side of the plant site. Again, a fleet of four to six dumpers would be employed, depending on the haulage distance. The dump trucks would be routed on internal haul roads; initially along the eastern edge of the application site to the west of the recharge lagoons. As the excavation

progresses to depth, temporary ramps would be created to provide access for machinery and service vehicles.

3.46 The interburden would be progressively removed in cells/strips measuring approximately 100m by 30m to expose the LMH after which the LMH would be excavated 'wet'. The initial strip would be located where ground water is at its lowest and be orientated parallel to the groundwater contours. The excavation would then progress up hydraulic gradient across the phase, which for Phase A is in a westerly direction.

3.47 For the initial strip, the interburden would be temporarily stockpiled within the workings pending placement into the worked out void. In subsequent strips, the interburden would be placed directly into the void. The LMH would be extracted, again using a 30t or 40t hydraulic excavator, with the excavator sitting on a platform slightly above the mineral.

3.48 Monitoring of groundwater levels at the application site shows that they are at their lowest between July and December (i.e. the last half of the year). In view of this and to avoid the need for pumping, the LMH would be excavated by campaign for up to six months in the year (divided into two or more campaigns). As with the UMH, as dug mineral would be transferred to the plant site using articulated dump trucks (typically a fleet of up to six).

3.49 Development within subsequent phases is illustrated on **Drawings HQ3/9** (for Phase B) to **HQ 3/14** (for Phase G).

Mineral Processing

3.50 All mineral excavated at the site would be processed on site. As set out above, as-dug material would be transported from the working area and placed within a stock pile located on the eastern side of the plant site.

3.51 From the stock pile, as-dug material would be placed into the feed hopper of the processing plant by a rubber tyred loading shovel (such as a CAT 972 or Volvo L180) from where it would be conveyed into the primary screen. The primary screen would take off the oversize stone (i.e. greater than 100mm) and the fine fraction (sand) via two vibrating screens. The oversize material is stockpiled for sale/reprocessing, whilst the fine fraction is transferred to the sand plant. From the primary screen, the middle grading of material (i.e. 4-100mm) would be transferred via a conveyor to a scrubber mill and further screens within the washing plant (refer to Drawing HQ 3/2). Material passing over all the screens (i.e. too large, and generally over 20mm) is conveyed to a cone crusher where it is crushed to reduce its size and then returned via conveyor to the screens. The screens spilt off the gravel into three fractions graded by size which are conveyed to stockpiles.

3.52 Periodically, material from the stockpiles would be transferred to larger stockpiles by rubber a tyred loading shovel.

3.53 Processed aggregates would be exported from the site by HGVs; typically these would be articulated lorries or rigid bodied tippers. Each lorry would, on entry to the site, be weighed in, and then loaded by a rubber tyred loading shovel. The HGV would then pass over the weighbridge again before leaving the site.

Infilling Operations

3.54 Preliminary discussions with the Environment Agency has established that the void left from the removal of the 'LMH' and interburden should be replaced with site-won, low permeability cohesive material but could also include suitable materials imported for the formation of both geological barrier and infilling.

3.55 The rationale for placing inert low permeability geological barrier material up to the upper surface of the interburden is founded on the principle that perched groundwater within the UMH is kept separate from regional groundwater in the LMH: this is to minimise the potential for mixing of groundwater in the lower regional aquifer with local perched groundwater.

3.56 In view of this, surplus overburden and interburden would be progressively placed in the base of the mineral workings to raise basal levels; the indigenous material would be placed against the sides of the phase to above the level of the groundwater in the LMH, above which an engineered barrier of indigenous interburden/suitable overburden would be used to provide an effective seal to prevent the mixing of ground water. This engineered barrier would be keyed into the surrounding interburden or previously engineered barrier to provide a continuous seal, on top of which the imported inert material would be placed.

3.57 In order to be able to provide a suitable final landform (as illustrated on Drawing HQ 3/14) suitable inert fill materials would be imported. This material would be sourced from the construction and demolition waste sector within the region, and typically imported in 20t loads by rigid bodied tippers.

3.58 Details relating to the management and control of imported materials would be regulated through the Environmental Permit. In brief, each load imported would be inspected at the weighbridge for compliance with the waste transfer documentation. If the load is found to be inconsistent, the importing vehicle would be turned away. Once accepted, the importing vehicle would be directed to the disposal area where the load would be tipped and a further inspection undertaken. The load would then be placed within the tipping area and compacted by a tracked bladed machine (often referred to as a bulldozer, such as a CAT D6 or similar).

Hours of Operation

3.59 The quarry would operate to the following hours:

Site preparation works (stripping, bund formation); mineral extraction, restoration (including infilling), processing and dispatch of aggregates:

- 0700 hours to 1800 hours Monday to Friday
- 0700 hours to 1300 hours Saturdays

No operations on Sundays or bank holidays save for emergency repairs.

Lighting

3.60 External lighting would be required around the plant site during the winter months. Lighting would be on mounted poles. All lights would be directional in order to minimize light spill, glare and sky glow, and would be aligned to ensure that the upper limit of the main beam does not project upwards. In particular, guidance provided by the Institution of Lighting Engineers[1].

3.61 It is not proposed to excavate the sand and gravel after dusk and thus no lighting would be required within the extraction area.

Environmental Controls

3.62 The EIA process has identified a number of measures that could be employed to ameliorate the effects associated with the operation of the quarry. Some relate to operational practices to help safeguard the amenity of local resident whilst others relate to the design of the quarry (for example associated with ground water protection).

Dust

3.63 As set out in Chapter 9 (of this Volume), a number of mitigation measures are proposed to ameliorate the generation of dust from the development of the quarry. These include:

- use of water as and when necessary, particularly in the event of dry and windy weather;
- vehicles transporting soil/overburden/mineral not overloaded;
- reduction of drop heights;
- minimise double handling of material;
- phased activity to minimise the duration of activity;
- avoid soils handling during adverse weather conditions;
- optimise timing regarding weather and seeding season. Seed as soon as possible;
- soil bunds and mounds profiled to minimise windblown dust;
- temporary cessation of activities in the event of unacceptable dust emissions in the vicinity of receptor properties;
- where material contains less than 3mm in size the material should be conditioned with water before the point of discharge into the pile;
- areas around the base of the storage piles would be clearly designated to ensure passing vehicles do not disturb dusty material and the area should be kept clean and in good repair;
- location of processing operations away from the closest receptors;
- enclosure of transfer points with chutes;

[1] Guidance Note 1 for the reduction of obtrusive light 2020, Institute of Lighting Professionals. https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2020/

- cleaning belts with scrapers and dust catch plates;
- materials are deposited carefully into screens by reducing drop heights and the correct matching of machine;
- ensure base of stockpiles clearly marked and shielded from wind and keep moist in dry weather;
- controlled use of haul routes;
- haul routes to be regularly maintained by grading to minimise dust generation;
- speed controls of 10mph to be implemented on all haul routes;
- all vehicles exiting the site carrying material are sheeted or totally enclosed as soon as possible after loading and before leaving site; and
- wheel wash installed at the site entrance and used.

Noise

3.64 'Built in' mitigation includes the use of peripheral screen mounds at the edge of the working areas. As noted above, these would be 3m in height (for soils storage, in line with best practice) and 4m in height for the overburden storage mounds. In addition, a 3m high acoustic fence would be installed on the western side of the access road to protect properties to the west of the application site.

3.65 In addition to the noise mitigation measures incorporated into the site design, good site management practices and other specific measures would also provide additional noise mitigation. These measures (as set out in Chapter 10) would include:

- activities within the review site would be undertaken in locations where noise attenuation from existing landforms would maximise the benefit to the noise-sensitive properties;
- internal haul routes would, wherever possible, be routed such that separation distances to the noise sensitive properties is maximised;
- all haul roads would be kept clean and maintained in a good state of repair to avoid unwanted rattle and "body slap" from vehicles;
- all mobile plant used at the proposed extension would have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments;
- all mobile plant and heavy goods vehicles entering the site will move in a circular pattern to minimise, as far as is practical and safe, noise from reverse warning systems;
- plant would be operated in a proper manner with respect to minimising noise emissions, for example, minimisation of drop heights and no un-necessary engine revving;
- plant would be subject to regular maintenance. All plant at the site would be fitted with effective exhaust silencers and would be maintained in good working order to meet manufacturers' noise rating levels. Defective silencers would be replaced immediately;
- plant that is used intermittently, would be shut down when not in use; and

- pumps, generators and compressors would be located behind existing screening mounds or landform, would be electrically powered and fitted with an acoustic covers where necessary. Diesel powered pumps, generators and compressors, if used, will be installed within acoustic enclosures.

Water

3.66 The operation and restoration of the quarry would be undertaken using current technical guidance, relevant Pollution Prevention Guidelines, other codes of best practice and consents, to limit the potential for contamination of both ground and surface waters.

3.67 Best practice techniques would be incorporated within the management procedures for construction and operation activities onsite in order to protect the water environment from pollution incidents. The mitigation measures can be summarised as follows:

- during construction there would be heavy plant and machinery required on site and as a result it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in the Environment Agency's Pollution Prevention Guidance (PPG1);
- in accordance with PPG2 all above ground on-site fuel and chemical storage would be bunded;
- an emergency spill response kit would be maintained on site;
- a vehicle management system / road markings would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision;
- a speed limit would be imposed on site to reduce the likelihood and significance of any collisions;
- the proposed restoration scheme would also be subject to an Environmental Permit, the application for which would include appropriate measures to avoid unacceptable impact on the environment including water;
- surface water runoff would be contained within the excavation areas and all water would be discharged to a recharge lagoon, this would reduce the risk of suspended solids entering surface waters; and
- a detailed water management plan would be prepared and agreed with the Environment Agency prior to work commencing at the site.

3.68 All groundwater pumped from the UMH would be recharged back into the aquifer so that there would be no significant loss of resource. The recharge area is relatively close to the points of abstraction and it is not envisaged that there would be a significant impact on water resources in either aquifer.

3.69 Restoration of the void with imported inert material would make a barrier to groundwater flow within the UMH. A back-drain is therefore included in the design to ensure groundwater levels do not increase above historically high elevations.

3.70 The restoration operations would be operated under an Environmental Permit that would ensure activities do not pollute the water environment.

Socio Economic Issues

3.71 The quarry would have a core staff of 6 employees. This would comprise a manager, a foreman, 2 loading shovel operatives, 1 dozer operative and 1 weighbridge operative.

3.72 The number of staff would increase to 10 during earthmoving works which will be undertaken on a campaign basis. This would be over a temporary period.

3.73 Allied to this the quarry would generate a number of indirect employment opportunities associated with the haulage of aggregates/concrete and the provision of services, such as maintenance and engineering contractors, landscaping contractors. The quarry would contribute into the economy through taxes, business rates and aggregates levy contributions. The development would thus secure these employment opportunities and wider socio economic benefits into the long term.

RESTORATION PHASE

3.74 This section of the chapter details how it is proposed to restore the application site to a beneficial after-use which has the following aims:

- to progressively deliver a landscape which is similar in character and appearance to the existing Ellenbrook Fields;
- to improve overall biodiversity interest and value at the site;
- reinstate the current accessibility of the greenspace to members of the local public; and
- fulfil all engineering requirements, in terms of managing surface water and groundwater environments at the site.

3.75 The landcover would consist of broad area of gently sloping conservation grassland (from west to east), divided by hedgerows and with some complimentary wetland and pond features, as illustrated by **Drawing HQ 3/15.**

3.76 At a more local level, areas of micro-topographical and substrate variation would be included to provide habitat diversity and enhancements (e.g. a range of species-rich grassland communities). The proposed waterbodies include both shallow scrapes, ponds and a deeper waterbody at the north-eastern end of the application site.

3.77 The scheme also aims to respond to the local landscape character of "Area 31 De Havilland Plain", which extends from Cromerhyde in the north, southwards across the former Hatfield Aerodrome and up to the ground of Oaklands College on the edge of St Albans, as defined in The Welwyn Hatfield Landscape Character Assessment (2005), which *inter alia* refers to "*an extensive level plain".* This is addressed further in Chapter 8 of this Volume.

3.78 The Herts and Middlesex Wildlife Trust have several grassland-based nature reserves, including Hunsdon and Eastwick Meadows, which is one of the finest surviving unimproved grassland sites in the county. Also the local biodiversity action has targets for the recreation of neutral grassland, acid grassland and heathland; the aspiration for the restored application site is to contribute to these targets as far as is practical, either through interim management during working phases or long-term aftercare of the final restoration areas.

3.79 The proposed hedge planting and open ditch/swale layout uses the 1888 historic field pattern which existed on the application site prior to the aerodrome and other interventions, with the aim of reinstating the broader landscape setting of the Popefield Farm listed building. Some of this remnant field pattern is still present on site, whilst some has been lost.

3.80 This would also create potential linkages with the existing watercourses, hedgerows, woodland and tree belts around the perimeter of the application site.

Progressive Working and Restoration

3.81 The proposed progressive scheme of working and restoration aims to ensure that disturbance is limited and continued access is provided to Ellenbrook Fields, as far as possible.

3.82 For example the western parts would be largely undisturbed (except for the access road) until the later stages. Parking is available alongside Ellenbrook Fields at Notcutts Garden Centre to the south-west of the site on Hatfield Road, and access via the public right of way would be maintained throughout the development period, but according to certain restrictions and diversions at certain periods. Access points would be installed over the perimeter storage bunds.

3.83 The initial site preparation works are shown on **Drawings HQ 3/6** and **HQ 3/7** which shows the new site access in the south-western corner and along the western part of the application site (whilst maintaining a standoff to the gas pipeline). The plant site, stocking and lagoon areas in the north and east would be stripped of soil and overburden and temporary storage mounds would be formed around the perimeters. The stripped areas of ground would then be built up as hardstanding using the mineral within the recharge upper and lower mineral lagoons in the east.

3.84 Subsequent establishment of each Phase would follow a logical sequence broadly working from east to west and where possible with soil and overburden direct placed onto worked out and backfilled void, to final restoration levels. However it is anticipated that, particularly during Phase A, soils and overburden may also need to be placed into temporary storage.

3.85 Detail methods of forming the perimeter seals within and around each phase will be determined as the development progresses.

3.86 The estimated volumes of site derived materials available from the proposed mineral extraction area are as follows:

- Topsoil (nominal 0.3m thickness) = 160,000m^3;
- Subsoil (nominal 0.9m thickness) = 478,000m^3;
- Overburden = 582,000m^3; and
- Interburden volume = 962,000m^3.

3.87 In addition approximately 150,000m^3 of topsoil and subsoil would be stripped from the access road, plant site and stocking area and areas of temporary storage (e.g. beneath subsoil or overburden) and then reinstated at the end of the development.

Restoration Landform

3.88 The final restoration landform would be based on imported inert material to backfill the worked out mineral voids near to existing ground levels, typically between 78m AOD in the west and 76m AOD in the east, to ensure that surface water can be directed towards the existing pipe which takes the Nast along the St Albans Road West.

3.89 An overflow at 75.5m AOD would be included within the waterbody to the north-east to also drain into this existing pipe. The invert of the existing Nast culvert along the side of the road is 71.78m AOD. The scheme aims to attenuate water flows and avoid flood risk.

3.90 A detailed landform design would be produced following the granting of planning permission to ensure minimum gradients typically from 1:100 to 1:200.

3.91 Overburden and interburden clays from the site would be used to provide basal lining, sidewall barriers and capping material for the tipping operation and subsequently covered by a restoration soil profile.

3.92 Approximately 235,000m^3 of suitable material would be required for the external liner around the site perimeter; this is based on a mineral cut of 1:1 down from extraction limit through the soil, overburden and upper mineral horizon down to the top of the interburden clay and then the amount of material needed to backfill to original ground levels, with a 5m wide crest at the top and 1:3 side slopes. Of this approximately 20,000 m^3 would need to be restoration soil (which is the crest area x 1m thickness), with the rest as impermeable barrier.

3.93 A further 505,000m^3 of suitable material would be required for the 1m thick engineered barrier / capping. The restoration soil profile would then be c1.2m thickness above this layer.

3.94 Thus the available 962,000m^3 interburden volume exceeds the anticipated suitable material required for the external liner around the perimeter and the engineered barrier / capping.

3.95 The plant site, stocking and other ancillary areas would also be restored using replacement of stored restoration soil and residual mineral to create ridge and furrow landform, on average 1m in thickness.

3.96 The access road and a small car parking / turning area would be retained as hard standing for continued recreational access.

Restoration Profiles

3.97 All soil and overburden resources would be conserved and reused and therefore there would be a surplus amount of material available in comparison to those required; this is dictated mainly by the inclusion of the waterbody in the east and other ponds, scrapes and wetland areas of c8ha, which would not require any soil cover and also the use of a mixture of soil and residual mineral within 10ha of the plant site area, as part of acid grassland habitat creation area and any other preferential use of soil-forming materials as part of the target grassland habitats. The total area of disturbance requiring a restoration soil profile is c65ha and the available 788,000m^3 of site-derived topsoil and subsoil volume would be sufficient.

3.98 All soils would be either direct placed onto final restoration areas or temporarily placed into storage / perimeter screening bunds. All bunds would be grass seeded, at the earliest available opportunity following construction.

3.99 Nevertheless, any potential new soils brought to site/recovered from the tipping operations would be inspected upon delivery to ascertain their suitability and quality, and any roots, debris or other undesirable materials present removed. The Planning Practice Guidance to the National Planning Policy Framework acknowledges the potential use of soil and soil-making materials where the after-use of mineral sites involves some form of plant growth.

3.100 Materials for use in species-rich grassland areas will have chemical and physical properties assessed, to ensure they deliver low fertility yet functioning restoration substrates capable of supporting these habitats in the long term. For example, acidic or alkaline material will be set aside for the creation of distinct acidic/calcareous grassland habitat types in suitable locations.

3.101 Restoration material of intermediate nutrient status (i.e. too high for use in species-rich grassland, but not good enough for (or excess to that required for) tree planting might be best targeted to the water attenuation lagoons. Similarly especially clayey material may have a specific role in the formation of ponds in these areas.

3.102 This is summarised below, although precise characteristics will be determined in accordance with Table 1 in BS 3882:2015, as appropriate:

- multi-purpose topsoil and/or medium to high pH (5.5 to 8.5), high N, extractable P and K, clay or loams – trees & scrub, wet grassland / lagoons;
- specific purpose, low fertility topsoil and/or mid pH, low/medium N, extractable P and K, loams – neutral grassland;
- calcareous topsoil and/or high pH (7.5 to 9.0), low N, extractable P and K, clay or loam – calcareous grassland; and
- acidic topsoil and/or low pH (3.5 to 5.5), low/very low N, extractable P and K, sand or loam – acid grassland.

Restoration Phasing and Techniques

3.103 The proposed development phasing would incorporate progressive restoration and landform development, involving annual programmes of soil handling, cultivations, seeding and planting undertaken at the earliest available opportunity. The details of the restoration programme would be reviewed with the mineral planning authority on an annual basis.

3.104 Compaction of the restoration soil layer would be avoided throughout all soil handling operations, as follows:

- stripping, loose-tipping and grading of soil materials, to specified profiles, would be carried out using tracked excavator or bulldozer in accordance with MAFF's Good Practice Guide for Handling Soils, published in 2000; and
- soil would only be handled when in a suitably dry and friable condition by reference to the lower plastic limit.

3.105 The only exception to the prevention of compaction within the restoration soil profile might be some localised areas to encourage wetter conditions and opportunities for marshy grassland species within the overall grassland mosaic. The permanent ponds will be lined with clay/compacted base and sides, with associated boggy margins.

3.106 Contrasting soil units would be recovered, stored and replaced separately. For example by the use of geotextile separator or the recovery of *in-situ* units before the construction of storage bunds.

Restoration After-uses and Techniques

3.107 Table 3-1 below compares the areas of existing and proposed land cover areas for the application site. This is also considered further as part of a Biodiversity Net Gain calculation which is set out in Appendix 11/1 to this Volume.

3.108 In addition around 1km hedgerows would be planted as part of the reinstated historic field pattern, in conjunction with the 2km advance planting undertaken at the outset of the development.

3.109 Approximately 0.6km of public right of way would be reinstated along its original route and permissive access paths would also be returned along similar routes to existing. Approximately 1ha access road and a small car parking area / site offices would be retained for recreational purposes.

Table 3-1
Site Summary Areas

Land-cover	Existing Site 2015 (ha)	Proposed Restoration Scheme (ha)
Grassland	84.9	72.4
Scrub	(Not measured, included in grassland above)	3
Woodland Planting		1
Waterbodies / Ponds / Wetland		8.5
Hardstanding / Parking Area and Access Tracks	1 (estimated area of former runways, etc)	1
	85.9	85.9

3.110 The restored surface would be initially cultivated to a fine tilth prior to drilling or broadcasting of the appropriate conservation grass seed mix (which would be based on substrate variation and characteristics to be determined) and sown to a low rate, typically of approximately 3-5g/m^2. In places this may be limited to bents and fescues and sown to allow a diverse sward to develop through natural colonisation.

3.111 If practicable seed material from a suitable donor site nearby may be used to aid species diversification, following consultation with the local Wildlife Trust or Natural England.

3.112 The proposed tree and shrub species mixtures for hedgerows and any other areas of advance planting would reflect the natural distribution of native trees and shrubs described by the Forestry Commission[2] and also the nature of the restoration substrate, which would be inspected and assessed prior to planting.

3.113 All plants would typically be well-grown nursery stock as seed-raised transplants, 1+0 (1 year old transplant) up to 60cm in height, depending on species. All species will be derived from stock of local origin, as defined by the Forestry Commission's "Regions of provenance and seed zones in Great Britain".

3.114 All plant handling and planting operations will comply with relevant clauses of CPSE 'Handling and Establishing of Landscape Plants' (obtainable from the Horticultural Trades Association).

3.115 There is an area of open water in the north-east of the site that would benefit waterfowl and wader species. This would be achieved by constructing the with relatively steep banks of c1:3, to minimise the extent of marginal plant growth and omitting any perimeter tree and shrub planting.

Aftercare

3.116 The restored site would be closely monitored throughout the 5 year aftercare period so that the most suitable management regime could be defined on an area-by-area basis. An aftercare management plan would also be formulated in consultation with the MPA.

3.117 The management plan would consist of both an outline scheme, submitted at the outset that would provide the overall objectives for the management of the site and the main management operations, and an annual, detailed scheme that would be submitted to the planning authority in the autumn of each aftercare year. It is also proposed that an aftercare meeting would be held on an annual basis to discuss the condition of the site and to agree the aftercare requirements for the following growing season.

3.118 For all areas, requirements for secondary treatments would be reviewed on an annual basis throughout the aftercare period, in order to identify and remedy any localised problems. For example the following conditions would be assessed and remedied where necessary (to methods agreed with the local planning authority): differential settlement, land drainage, vegetation failure, stones/stone-picking.

3.119 Fertiliser requirements would also be assessed on an annual basis throughout the aftercare period.

3.120 It is acknowledged that under the provisions of the Weeds Act 1959, it is the responsibility of all occupiers of land, whether used for agriculture or not, to control injurious weeds so that they do not spread. For all areas, weeds would be controlled by the appropriate application of herbicides by a certified competent person, according to manufacturer's instructions or, in areas of grass, by cutting or grazing.

[2] Creating New Native Woodlands, Rodwell & Pattersen (1999), Forestry Commission Bulletin 112

3.121 The new grassland mosaic would be mown twice during the first season to increase tillering. Cuttings would be removed from site where necessary to prevent the cut material suppressing germination and to remove a potential source of nutrients that might otherwise enrich the substrate and encourage colonisation by competitive grassland and ruderal species.

3.122 It may be necessary to apply brashings and/or further seed in subsequent seasons to aid the establishment of target species. This would be carried out as part of the September to November maintenance visits.

3.123 Grazing with sheep would be introduced as soon as appropriate, according to stocking densities to be agreed determined.

3.124 All new tree and hedgerow plants would be protected and maintained to a 1m diameter weed free condition. Plants, guards and canes which have become loose, over-tight or broken would be re-firmed and adjusted on an annual basis.

3.125 The general aims of the water body management would be to improve water quality, increase biodiversity and enhance amenity and appeal. Monitoring of the waterbody will be as follows:

- Water quality would be assessed by identifying concentrations and sources of pollutants (nutrients);
- Biodiversity would be assessed by carrying out surveys for aquatic plants, zooplankton and invertebrates;
- Amenity and appeal of the lakes would be assessed by visual inspection, to include erosion, odour, plant and animal deaths; and
- Freshwater algae would be monitored in particular, excessive accumulations of foams, scums and discolouration of the water. The Environment Agency would be contacted for advice in the event of algae bloom appearing on the site in response to the threat to wild and domestic animals, fish and humans.

3.126 All planting/seeding failures would be replaced on an annual basis, during the first two years of aftercare, to ensure 100% maintenance to the agreed densities/land cover. All replacements would use plants of the same species or other such species as may be agreed with the local planning authority. If abnormal plant or tree failure persists then investigations and proposals for the remedying of site conditions would be prepared and agreed with the local planning authority.

3.127 Reinstatement of footpaths and public access would also take place during the aftercare period, when it is considered safe to do so and where it won't be detrimental to the establishment of the habitats and land cover.