

Nature and Heritage Conservation

Screening Report: Bespoke Waste

Reference	EPR/HB3602MC/A001
NGR	TQ 02745 79484
Buffer (m)	400m
Date report produced	07/05/2021
Number of maps enclosed	1

The nature and heritage conservation sites and/or protected species and habitats identified in the table below must be considered in your application.

Protected Habitats Screening distance (m) Further Information

Deciduous woodland	up to 50m	Natural England
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Where protected species are present, a licence may be required from [Natural England](#) to handle the species or undertake the proposed works.

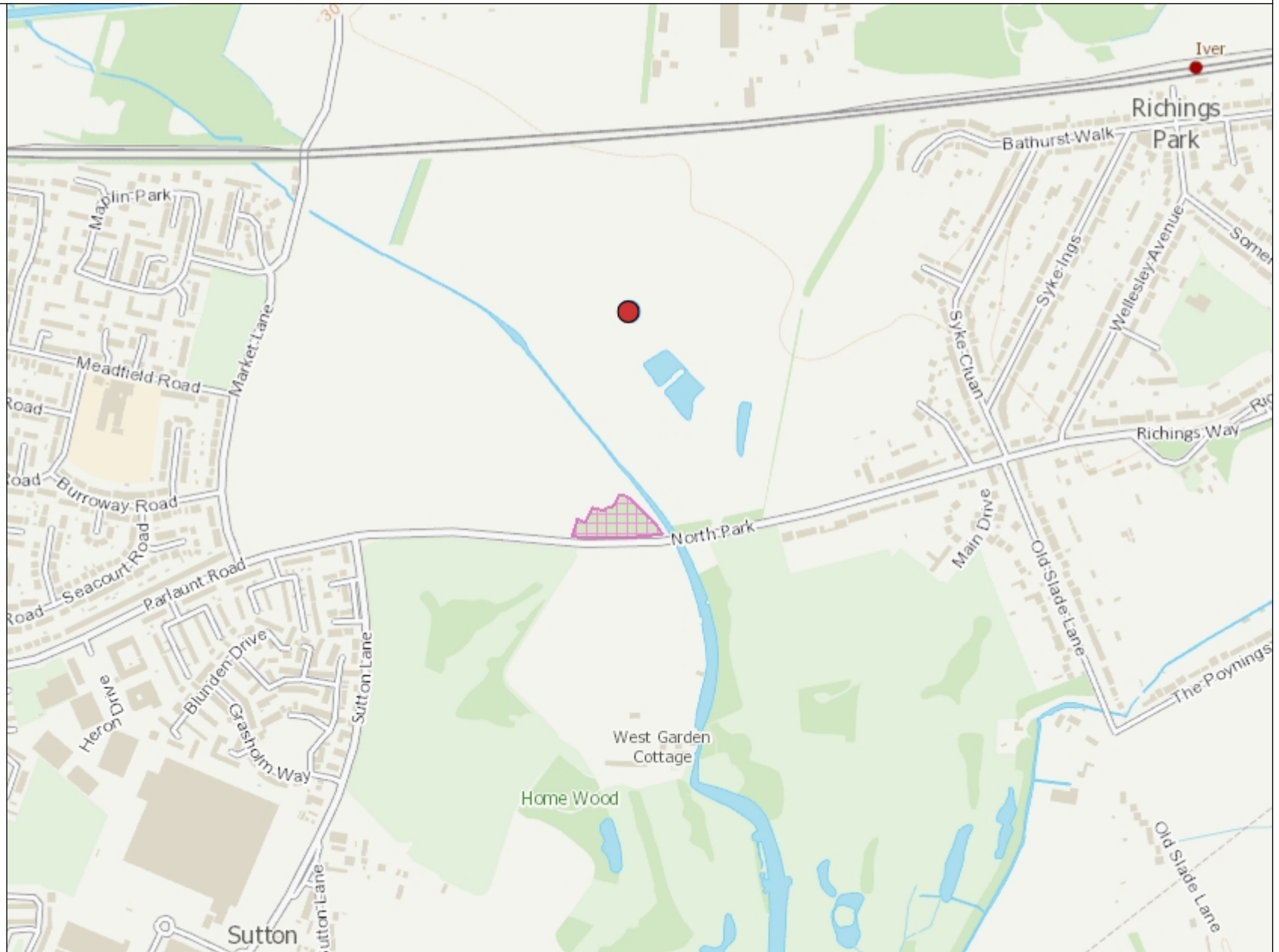
Please note we have screened this application for protected and priority sites, habitats and species for which we have information. It is however your responsibility to comply with all environmental and planning legislation, this information does not imply that no other checks or permissions will be required.

Please note the nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application, which could result in the return of an application or requesting further information.

Protected Habitats

Legend

-  Protected Habitats screened for En Permits





Langley Quarry: Flood Risk and Drainage Assessment

Langley Quarry: Flood Risk and Drainage Assessment

Prepared for

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Report reference: 64036R2, August 2016
Report status: Final Report

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Prepared by
ESI Ltd

Langley Quarry: Flood Risk and Drainage Assessment

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1 INTRODUCTION

1.1 Background

CEMEX UK Materials Ltd. (CEMEX) is submitting a planning application for the proposed mineral extraction from land formerly known as “Land north of North Park road, between Langley and Richings Park, Bucks SL0 9DJ” (the Site). The proposed Site, as shown in Figure 1.1, covers approximately 37 hectares and is a green field site.

The proposal is to restore the land back to original ground levels, including infilling with inert material. The site plan is set out in Appendix A.

1.1 Scope of work

CEMEX instructed ESI Ltd. (ESI) in August 2015 to prepare a Flood Risk Assessment (FRA) in support of a planning application for the Site. The initial draft of this report has been updated in July 2016 to include a revised site area and surface water management scheme. A separate hydrological and hydrogeological impact assessment (HIA) (ESI, 2016) has also been undertaken by ESI and this report forms an appendix to the overarching HIA. ESI is an independent environmental consultancy which specialises in hydrogeological and hydrological assessment.

The scope of work included the preparation of the FRA, following the guidance of the National Planning Policy Framework (NPPF) (DCLG, 2012), to satisfy both the Environment Agency and the LPA that all potential flood risks to and from the proposed development have been considered.

Site-specific calculations have been performed to estimate surface water run-off generation during a modelled 1 in 100 year event which also accounts for the effect of climate change using the latest advice provided by the Environment Agency (Environment Agency, 2016). Appropriate site specific flood risk mitigation measures have been included with recommendations for a strategy for managing and mitigating any flood risk posed to the Site.

The objective of this report is to provide a FRA of the operation and restoration of the Site.

1.2 Data sources

The information presented in the report is predominantly based on secondary data analysis associated with both the Site itself and the surrounding land area. The main sources of data are summarised below.

- Outline Site Plan (DrawingP1-739-3D) provided by CEMEX (Appendix A);
- Topographical survey (15_03 LANG MOD TJB) provided by CEMEX;
- Site visit undertaken on 9 September 2015;
- Environment Agency Modelled Flood Levels and maps (Product 4)(Appendix B);
- Ordnance Survey mapping;
- Site-specific rainfall data from the CEH Flood Estimation Handbook (NERC, 2009);
- British Geological Survey mapping for desk study of geology and ground condition;
- Soil types and permeability data from the National Soil Research Institute (NSRI, 2014).

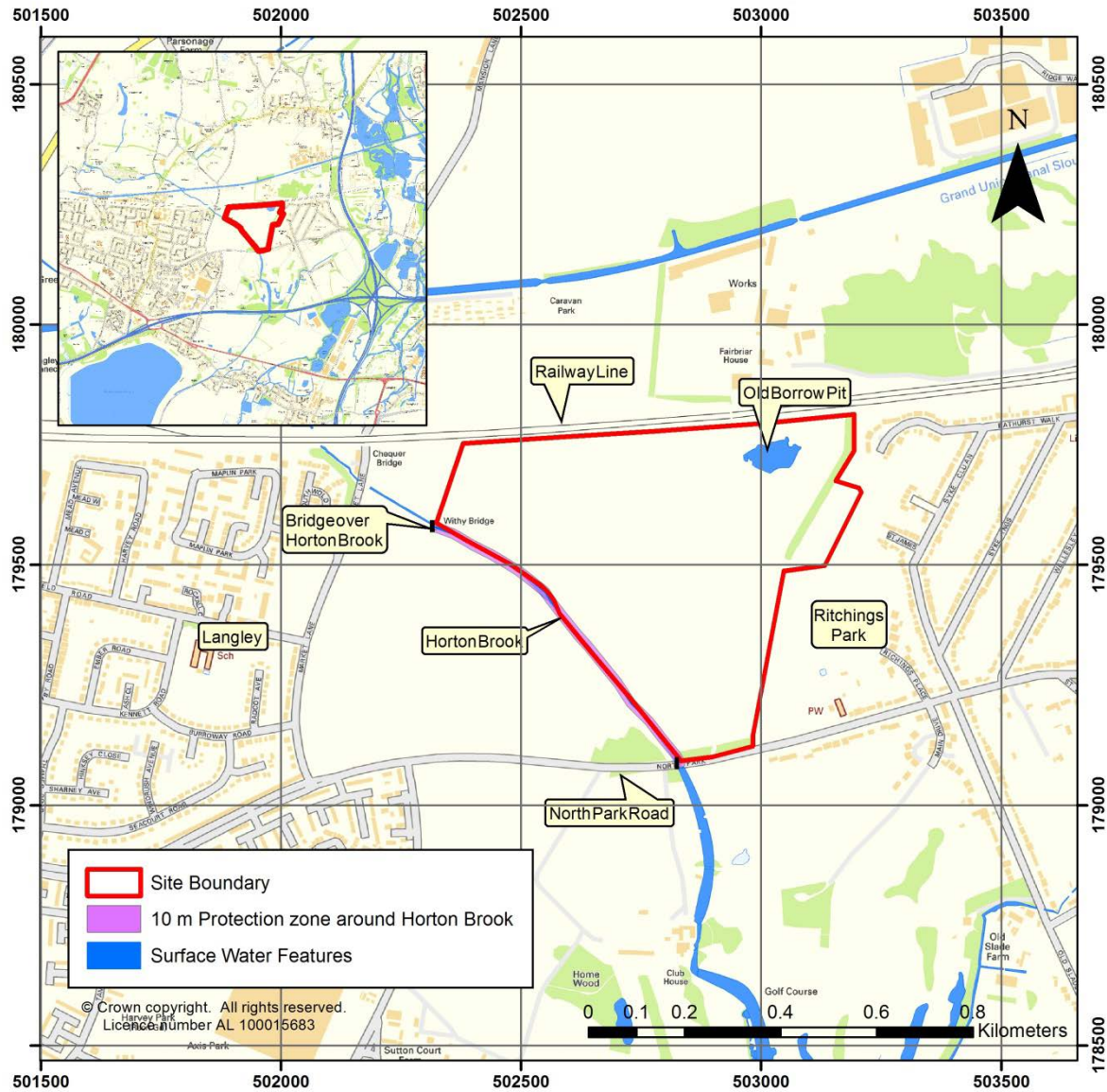
1.3 Report limitations

This report excludes consideration of potential hazards arising from any activities within the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

1.4 Risk assessment approach

An assessment of flood risk has been undertaken in accordance with the NPPF (DCLG, 2012) and following the Planning Practice Guidance (DCLG, 2014). Flood risk to and from the Site has been assessed and potential mitigation measures have been outlined.

Figure 1.1 Map of area surrounding the Site



2 SITE DESCRIPTION

2.1 Site setting and surrounding area

The Site is currently Greenfield land located between Langley to the west and Richings Park to the east. North Park Road lies to the south of the Site and the Bristol to Paddington railway line lies immediately to the north (Figure 1.1).

The southwestern boundary of the Site is defined by Horton Brook and a line of trees running from northwest to southeast. The corridor of land adjacent to the brook lies in Flood Zone 2 and Flood Zone 3. The Site elevation is between 25 and 35 m Above Ordnance Datum (AOD).

2.2 Geology

The majority of the Site has not previously been worked for mineral except for a small area towards the northeast of the Site (ESI, 2016) which is referred to as the Old Borrow Pit. At this location, the void still exists as shown by the pond area on Figure 1.1 and observed during the site visit.

2.2.1 Superficial Deposits

The following superficial deposits are observed in the Site:

- Head deposits primarily restricted to the area adjacent to Horton Brook. These comprise silt, sand and clay with variable gravel.
- Langley Silt Member which varies from silt to clay and overlies the Lynch Hill Gravel.
- Lynch Hill Gravel which belongs to the forth terrace of the post diversionary deposits of River Thames and its tributaries. This covers the northeast area of the site and it comprises mainly sand and gravel, with local lenses of silt, clay or peat.

2.2.2 Bedrock

London Clay Formation has been proven in all the site investigation boreholes and the groundwater monitoring boreholes as they penetrate the top of the London Clay (ESI, 2016). The base of the London Clay is proven to 25.9 mbgl at BGS borehole TQ07NW430 which is located approximately 150 m north of the Site and 37.8 mbgl at TQ07NW642 approximately 850 m north east of the Site (BGS, 2015). The thickness of the London Clay at these two locations is 24.3 m and 29.8 m respectively. The London Clay consists of blue grey clay, with subordinate silt and fine-grained sand, which is particularly abundant at the base and the top of the formation.

2.3 Hydrology

2.3.1 Rainfall

The Standard Average Annual Rainfall (SAAR) at the Site is 639 mm based on data for the period 1961 -1990 (NERC, 2008).

2.3.2 Surface water features

Surface water features in the vicinity of the Site were verified during a site visit undertaken on 9 September 2015 and are shown in Figure 2.1 (all elevations are estimated from the topographic survey).

Horton Brook runs along the southwestern margin of the Site in a northwest to southeast direction. The brook was dry during the site visit. The width of the stream north of the site is c. 2 m and the depth is c. 2.5 m. The brook is wider and shallower toward the south where it is c. 4 m wide and c. 1.5 m deep

The Grand Union Canal passes c. 300m to the north of the Site to the Langley town. The width is c. 10 m.

Colne Brook flows in a roughly north to south direction approximately 1.5 km to the east of the Site. The river is approximately 8 m wide where it was observed to the southeast of the Site.

There is a small stream at the western boundary of the site that runs from the railway line in the north to Horton Brook. This stream was dry during the site visit. The width is c. 0.6 m and the depth is c. 0.6 m. A circular culvert of diameter approximately 70 cm connects the stream to Horton brook.

There is an existing pond in the northeast corner of the Site. This was mostly dry at the time of the site visit. There are a number of small ponds approximately 500 m to the south of the Site as shown in Figure 2.1. There are located within the Richings Park Golf Club and scattered on both banks of the Horton Brook.

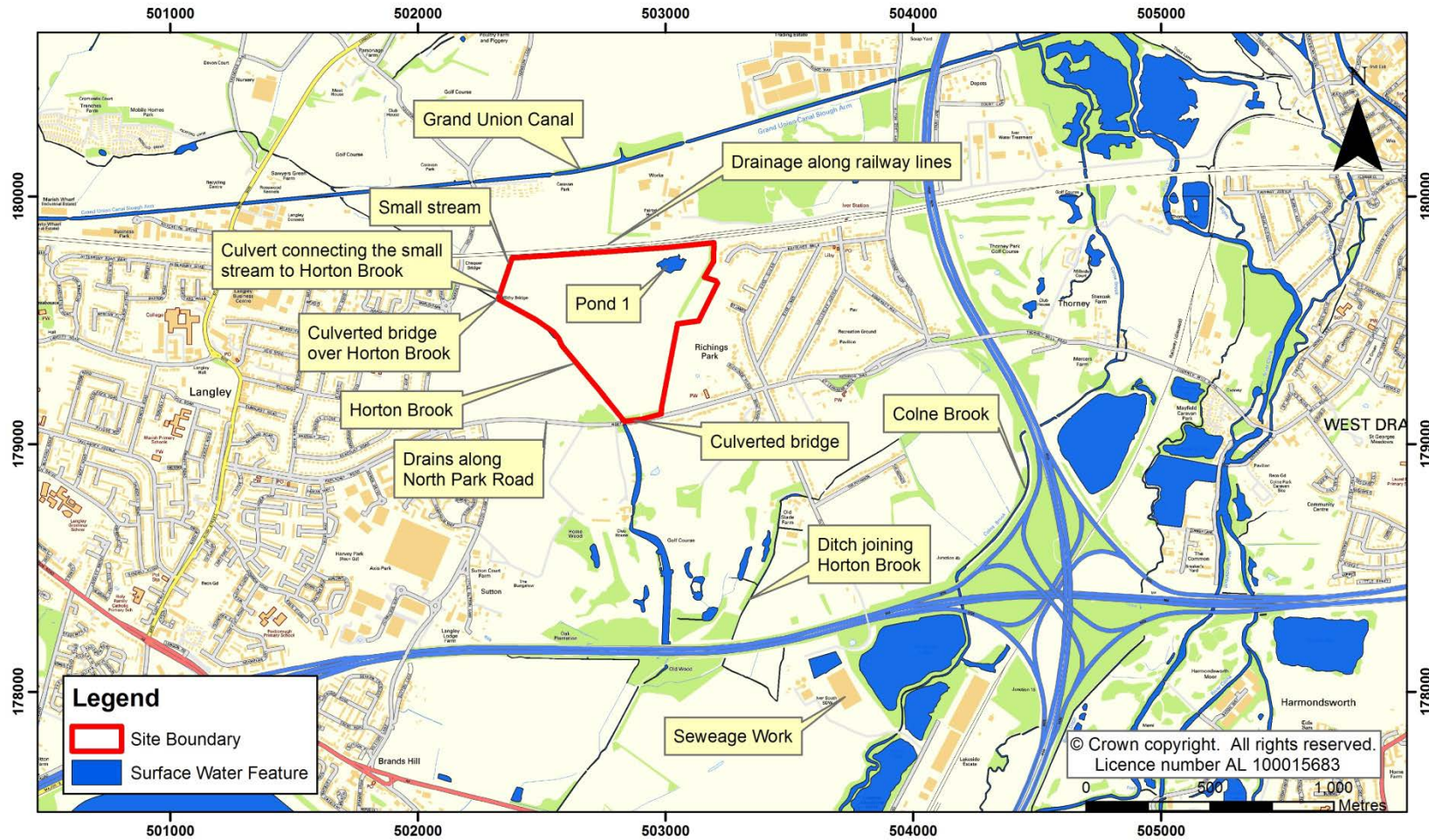
There is a culverted bridge on the North Park Road near the site access to the south and the Horton Brook runs under the bridge.

There is another culverted bridge on Horton Brook near the western boundary of the Site and this connects the land to the northeast and southwest.

2.3.3 Surface water flow and levels

The Environment Agency does not monitor the stage or flow in the Horton Brook. They confirm that there are no flow gauges within 3 km of the Site. The nearest flow measurement site is approximately 6 km downstream of the Site.

Figure 2.1 Surface water features (arrows indicate direction of flow)



3 PROPOSED DEVELOPMENT

The Site has been previously promoted to the County Council for sand and gravel extraction and more recently representatives from the Company appeared at the Examination of the Buckinghamshire Minerals and Waste Core Strategy in February 2012.

The development proposes a temporary closure of public footpath IVE/15/1, followed by the laying out of a site entrance and erection of new processing and concrete plants and related infrastructure. It is then proposed to extract of approximately 2 million tonnes of sand and gravel, backfilling with inert waste and progressive restoration of the land to agriculture over a period of up to nine years.

Sand and gravel will be extracted from the site in 5 phases over an approximate 5 year period. The sand and gravel would be extracted at a rate of some 400,000 tonnes per annum. Following extraction of each phase the land will be restored to existing levels using inert fill material – 2.7 million tonnes. This restoration work will follow on directly behind the extraction of material from each phase. The overall restoration of the site will be to agriculture back to existing levels. The restoration scheme will look to provide local biodiversity enhancements with the possibility of improved local informal access.

The site will be accessed from North Park using the existing field access along the southern boundary.

There are oil and gas pipelines adjacent to and following the course of the Horton Brook requiring a minimum 30 m standoff between the workings and the watercourse. This standoff will also serve to protect the Brook during the operational phase.

3.1 Excavation and restoration phase

It is proposed that the mineral will be worked wet below the water table and a long reach excavator will be used to extract material below the water table with no requirement for dewatering. A screening bund will be constructed on the eastern side of the Site to provide protection for the adjacent properties (see working plans, Appendix C). This will be constructed from sub and top soils stripped from the site.

A side wall geological barrier will be constructed around each of the phases prior to restoration with imported inert waste (ESI, 2016). The design maximum hydraulic conductivity for the geological barrier is expected to be 1×10^{-6} m/d. As these barriers will be more than 10 m wide (in order to allow for vehicle movements and turning circles), this will provide the equivalent protection to that required by the Landfill Directive (which is a minimum thickness of 1 m with a maximum hydraulic conductivity of 1×10^{-7} m/s). The geological barriers will be constructed from selected waste. Details on how the waste will be selected will be provided in the environmental permit application. As much of the waste accepted to the site within the London region is clay, it is possible that the geological barrier may have a lower hydraulic conductivity and we have assumed here that it is 1×10^{-8} m/s (this value is based on the likely value following placement of London Clay material below water).

Given the permeability of the side wall geological barrier and the underlying London Clay, it is possible that water will pond within the void. CEMEX will monitor the quality of the water in the quarry void via regular sampling and testing. Such sampling and testing will be defined in the groundwater monitoring plan that will be agreed for the environmental permit. It is expected that the water quality will remain high (i.e. the source term from the imported waste will be sufficiently low as to not cause an observable deterioration in water quality). In the event that the water in the void builds up such that it might overtop the geological barrier, the water will be pumped into the adjacent part of the quarry where the geological barrier has not been constructed allowing it to discharge back to groundwater. Alternatively this water could be pumped into the silt lagoons that will be constructed for mineral processing. In the event that the water quality is observed to deteriorate and discharge is required, then the water will be tankered off site for treatment.

A processing plant and associated infrastructure; weighbridge and office wheel-wash, mess cabin, car park and fuel compound, will be located in the southern corner of the site. A lagoon will be constructed in the northern part of Phase 5 (plant site) as shown on the working plan (Appendix C).

3.1.1 Post restoration phase

Following restoration of the site with imported inert waste, the site will be returned to the original ground levels and surface water will revert, after suitable attenuation, to running off to Horton Brook. A number of shallow ponds will be constructed adjacent to Horton Brook to provide this attenuation and additional habitat benefits. These are shown on the restoration plan (Appendix D).

It is anticipated that it will take approximately a 9 years of importation of inert materials to restore the Site to the original ground level. The final phase will be to take the sub and top soils stored in the screening bunds and replace them for the final restoration.

4 FLOOD RISK TO THE PROPOSED DEVELOPMENT

4.1 Exception and sequential tests

The Sequential Test, outlined in the NPPG (DCLG, 2014), identifies that development should be directed to areas at the lowest probability of flooding. The Site is classified by the Environment Agency as being located partly within Flood Zone 3. Sand and gravel working is considered by the NPPF as a water compatible land use and the proposed development is considered to be appropriate for this location, as shown in Table 4.1.

Table 4.1 Flood risk vulnerability and flood zone compatibility

Flood risk vulnerability classification		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	x	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	x	x	x

✓ Development is appropriate.

x Development should not be permitted.

Data source: National Planning Policy Guidance (NPPG) (DCLG, 2014).

4.2 SFRA Recommendations

Buckinghamshire County Council's SFRA for minerals and waste local development framework (Jacobs, 2011) seeks to ensure that the suggested design recommendations for new extraction sites and associated development can be imposed consistently at the planning application stage. For example development within mineral extraction sites should adopt a sequential approach towards steering office accommodation, storage and processing areas to lower areas of flood risk, even within the site. This is essential to achieve flood risk reduction and future sustainability within Buckinghamshire.

4.3 Flood risk to the proposed development

4.3.1 Flood Map for Planning

The majority of the Site is located within the Flood Zone 1 which has less than 1 in 1000 years annual probability of fluvial flooding. Although the part of the Site adjacent to the watercourse is within the functional floodplain of the Horton Brook this area is within the 30 m standoff and no development will take place in the functional floodplain. Horton Brook flows northwest to southeast along the southwest edge of the Site. The floodplain of Horton Brook extends along the southwest edge of the site and is classified as Flood Zone 3 (Figure 4.1). Most of the floodplain is also within the 30 m standoff zone, but a very small section of the Site in the north western corner may fall within Flood Zone 3.

4.3.2 Flood defences

There are no flood defences on Horton Brook near the Site as observed during the site visit. Flood maps presented in Figure 4.1 for planning have been developed without considering any defences. However, Horton Brook has been modelled as a part of Lower Colne Mapping and Modelling Study (Mott Macdonald, 2012). Modelled outlines take into account catchment wide defences as presented in Figure 4.2.

4.3.3 Environment Agency modelled flood level and extent

The EA has also provided modelled flood elevations for the stretch of the Horton Brook adjacent to the Site. The modelled water levels for the Site range from 25.3 mAOD (to the northwest of the Site) to 23.8 mAOD (to the southeast of the Site) for the 1 in 100 year event including allowance for climate change. The modelled flood level in Horton Brook is 25.23 mAOD (the node HB106 of the watercourse) and 23.79 mAOD (the node HB99U) for the 1 in 100 year event plus climate change. The extent of the latest modelled flood outline and modelled levels are shown in Appendix B.

4.3.4 Historical Fluvial Flooding

The Environment Agency flood records show that an area to the south along Horton Brook was flooded in 2003 (Figure 4.3). The historic flood event outlines do not provide a definitive record of flooding. It is possible that there will be an absence of data in places where the extent of flooding was not recorded. It is also possible for errors occur in the digitisation of historic records of flooding.

Figure 4.1 Environment Agency Flood Zone map (Site boundary in red)

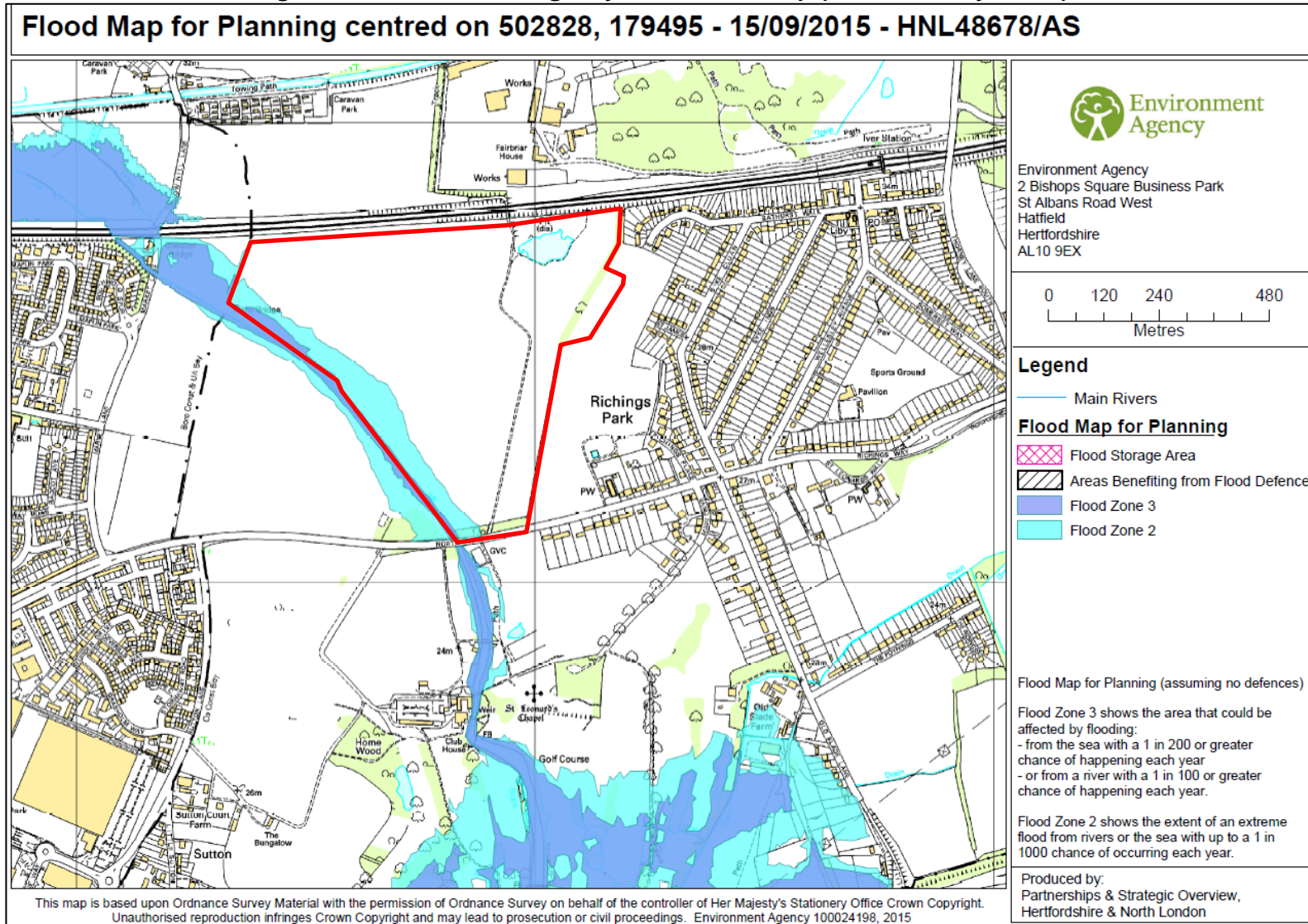


Figure 4.2 Environment Agency defenced flood outlines map (Site boundary in red)

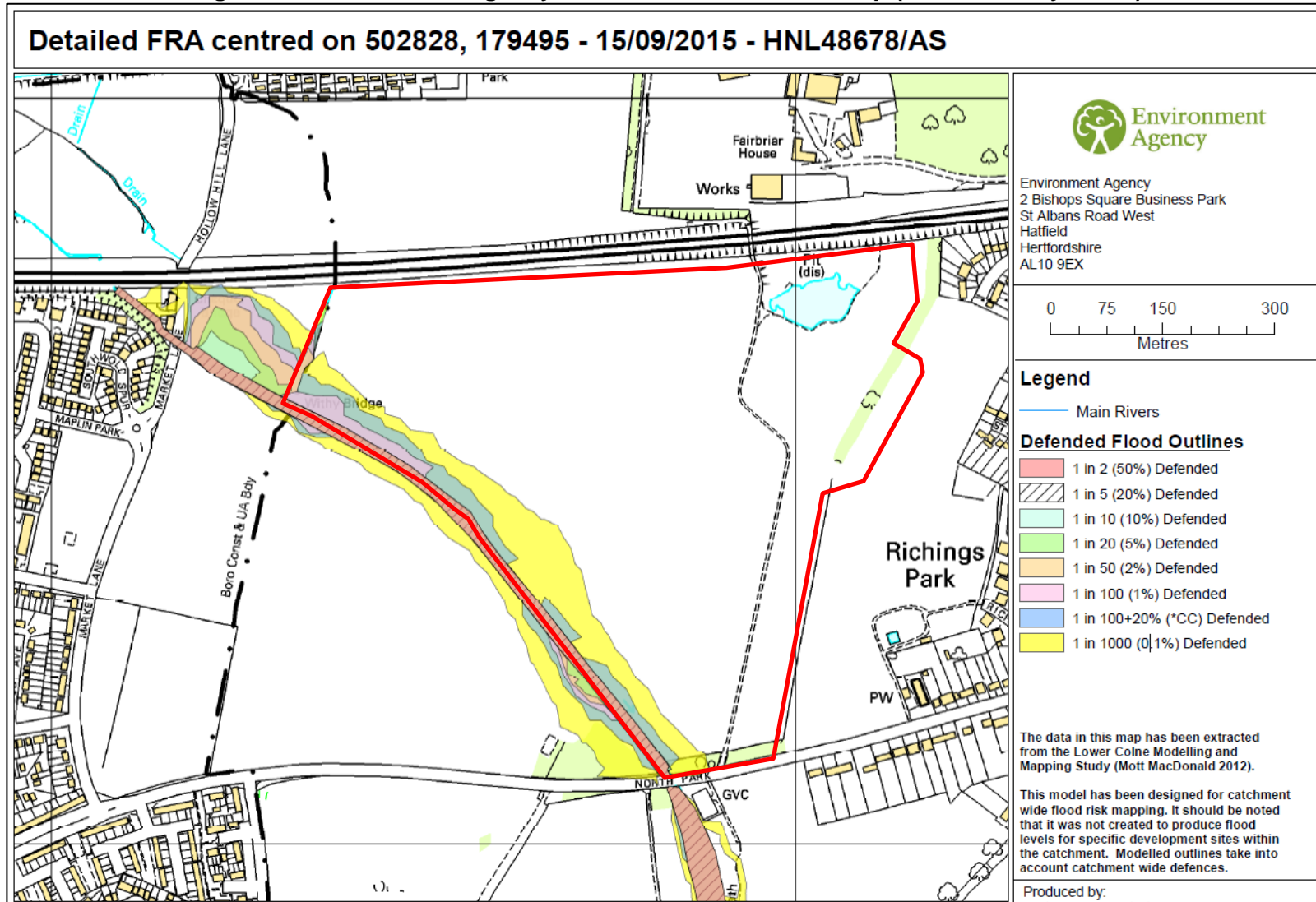
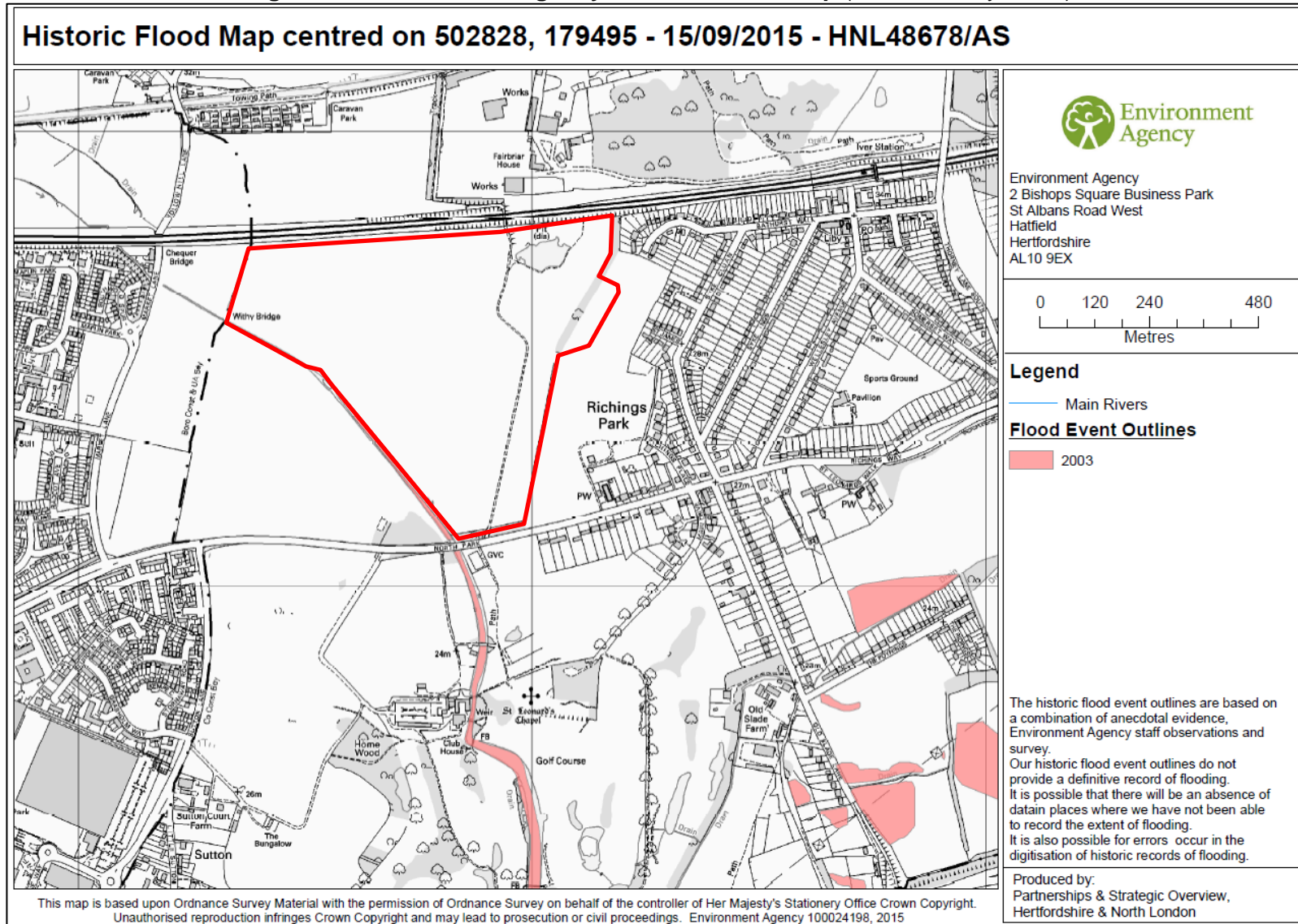


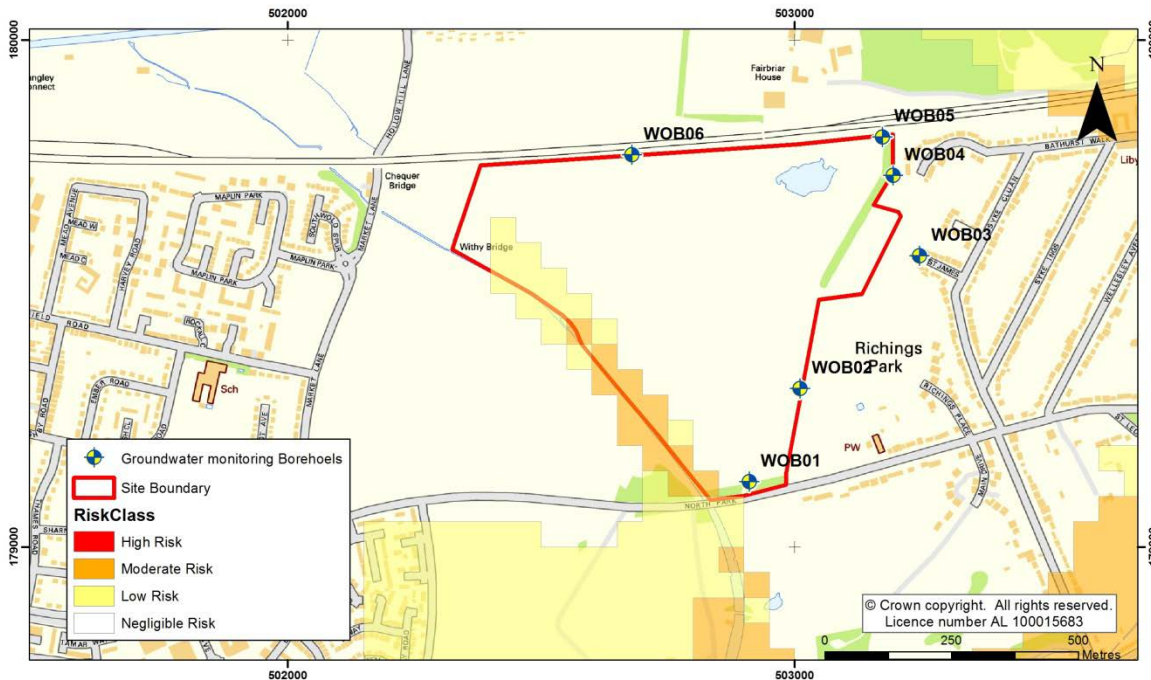
Figure 4.3 Environment Agency historical flood map (Site boundary in red)



4.3.5 Groundwater flooding

Groundwater flooding occurs when the water table rises above the ground surface or into man-made ground. The Site has low to moderate risk of groundwater flooding as presented in Figure 4.4. This is due to the underlying superficial deposits which are relatively permeable and likely to be in continuity with water levels of Horton Brook.

Figure 4.4 Groundwater flood risk map (ESI, 2014)



There are six groundwater observation boreholes (Figure 4.4) that provide groundwater level data on the Site. Hydrographs and a discussion on groundwater level is presented in ESI (2016). Whilst the length of time these wells have been monitored is quite limited, the data suggest that groundwater flooding at the Site is not likely.

4.3.6 Surface water (pluvial) flooding

Surface water (pluvial) flooding is usually associated with extreme rainfall events but may also occur when rain falls on land that is already saturated or has a low permeability. Rainfall that is unable to infiltrate into the ground generates overland flow which can lead to flooding or 'ponding' in localised topographical depressions before the run-off is able to enter the drainage system or watercourse.

At Langley Quarry, the risk of surface water flooding is identified as very low for the majority of the Site (Figure 4.5). A high risk of pluvial flooding is identified along the Horton Brook which has greater than or equal to 1 in 30 chance of flooding in any given year.

4.3.7 Flooding in the event of reservoir failure

The majority of the Site is not at a risk of flooding from reservoir failure. However a small section of the Site has high risk of reservoir flooding along the Horton Brook as shown in Figure 4.6. The Environment Agency defines high risk, if peoples' lives would be in danger as a result of an uncontrolled release of water from the reservoir. Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925 (Environment Agency, 2015). However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. Since the Langley Quarry is located in an area that could be affected, an emergency evacuation plan is provided in the next section of this report.

Figure 4.5 Risk of flooding from surface water (Site boundary in red)

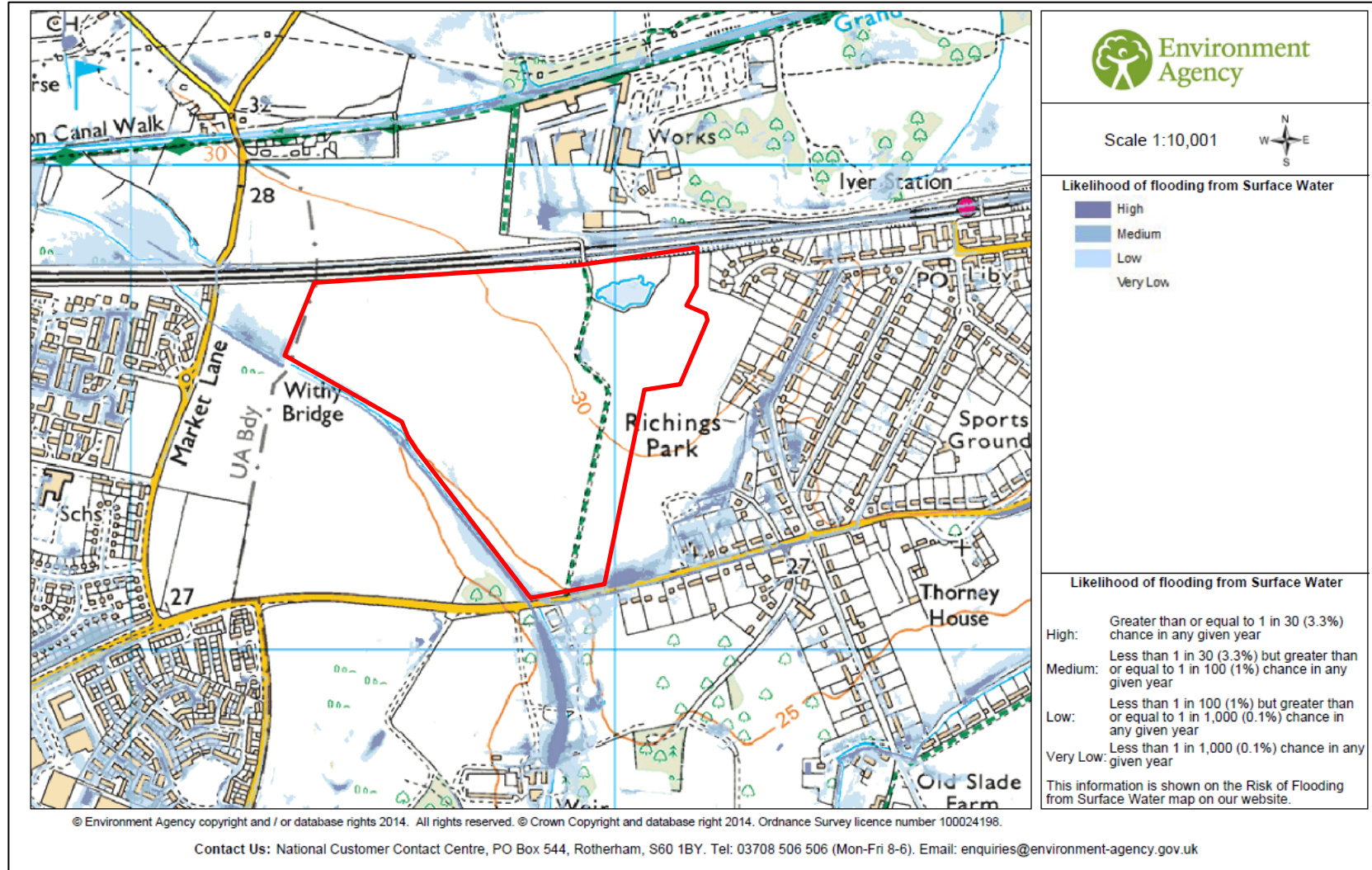
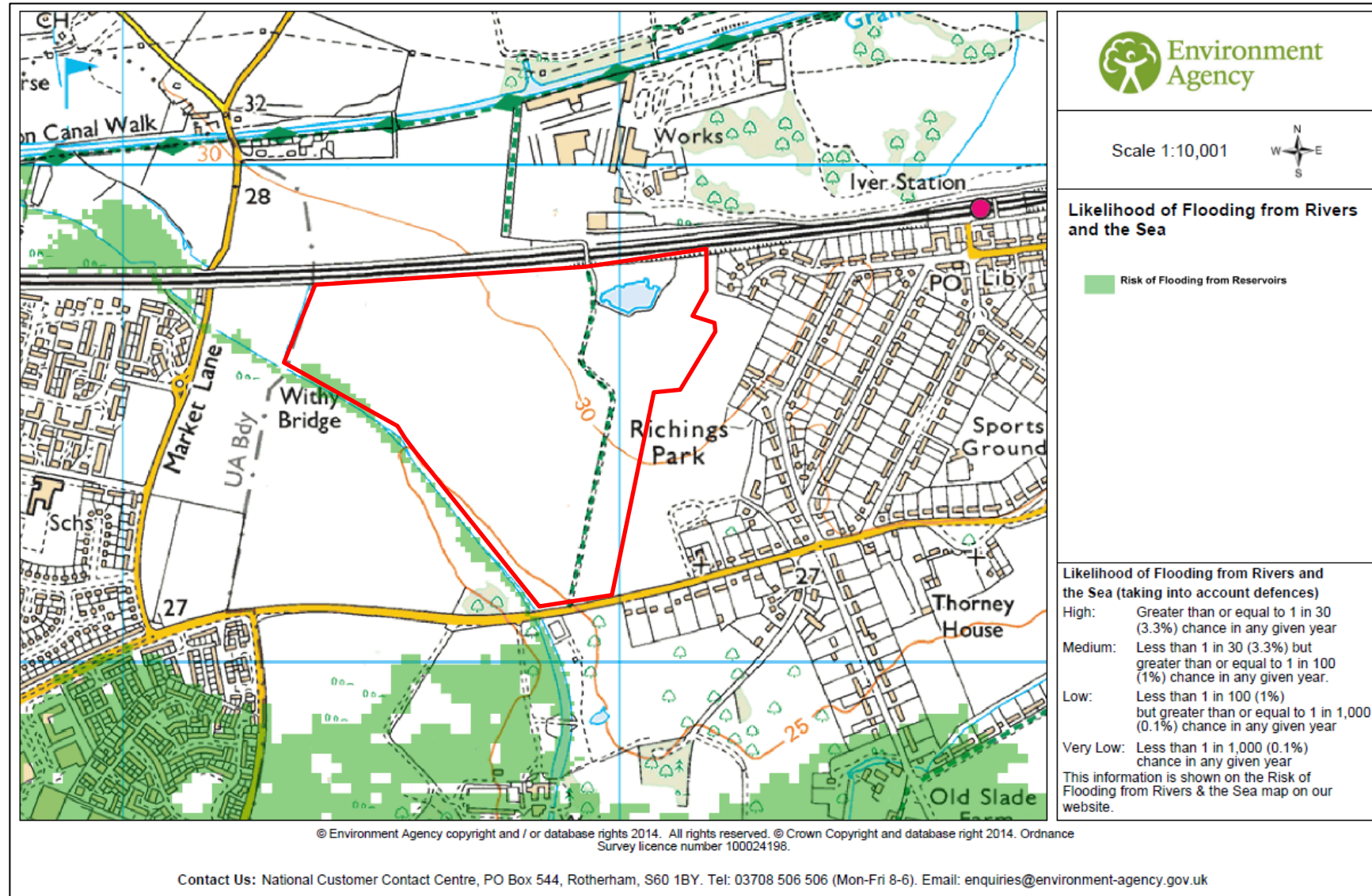


Figure 4.6 Risk of flooding from reservoir failure (Site boundary in red)



5 ON SITE FLOOD RISK MITIGATION MEASURES

5.1 Emergency Evacuation / Safe Egress Routes

A small part of the Site lies in flood zone 3 which has an annual risk of fluvial flooding of 1 in 100 or greater. No offices or plant will be located within flood zone 2 or 3, i.e. within the 1 in 1000 annual fluvial flood risk zone. It is recommended that an evacuation plan is developed and that all personnel are aware of procedures whilst operations are on-going in proximity to Horton Brook. An egress route away from the brook towards higher ground in the northeast should be maintained throughout the operational phase. Therefore a safe refuge point can be found on the Site as flood levels are unlikely to reach to the higher ground of the Site.

During high rainfall events, mobile plant will be moved to the higher ground at the processing plant site which is located in Flood Zone 1.

In the event of reservoir failure, the egress route and refuge point adopted for fluvial flooding should be adapted with reservoir level warning provided by the reservoir operators.

5.2 Standoff

Oil and gas pipe lines run approximately 10 m away from the right bank of Horton Brook. The 1 in 100 year flood outline (zone 3) covers c. 30 m both side of the river bank. It is recommended that a standoff of 30 m is maintained on the northeastern bank in order to protect the oil and gas lines and to protect against bank erosion. Whilst this will result in some excavation and restoration within flood zone 3, the works will result in a temporary increase in the flood zone which will have a temporary beneficial impact on downstream receptors. Following restoration the downstream flood risk will be returned to greenfield rates.

5.3 Screening bund

A screening bund will be constructed on the eastern side of the Site to protect the adjacent properties during the operational phase. Following restoration the bund will be removed. This area lies within flood zone 3 and has no impact on flood storage.

5.4 Flood plain storage

During the operational phase, the Site will create a void. The excavated sand and gravel will be transported to the processing plant. The processing plant and any associated stockpiles will be located away from Flood Zone 2 and 3. Therefore no flood storage reduction is anticipated during the operational phase.

Should Horton Brook exceed its bankfull condition whilst digging close to the brook, water will be allowed to flood the quarry void. This will act to reduce the flood risk downstream of the site.

Following excavation a geological barrier will put in place around each of the phases using selected imported inert waste. The geological barrier will be constructed below the existing ground levels and will replace the existing natural soil in the Site. Placement of the barrier will therefore have no impact on reduction of flood plain storage.

The land will be restored back to the original ground levels. Therefore no compensatory flood storage is required during restoration.

5.5 Flood Warning

The above measures outlined will mitigate flood risk to the Site during operation and restoration. However the Site has a residual risk to the people working in the proximity of Horton Brook. The Site does not benefit from an Environment Agency flood warning system. Therefore a flood warning system is to be employed to ensure the operation is worked in a safe manner.

6 FLOOD RISK FROM THE PROPOSED DEVELOPMENT TO THE SURROUNDING AREA

6.1 Risk to property

A number of residential properties are located close to the Site boundaries as summarised in Table 6.1 below along with an assessment of flood risk. The closest of these, “The properties at Langley, to the west of Sutton Lane” and “the railway line to the north” lie approximately 20 m from the southern and northern boundary of the Site respectively. Section 7 below presents an outline drainage strategy for the proposed development which will prevent run-off leaving the Site and will therefore remove the risk of the development impacting on these properties.

Table 6.1 Properties close to the Site

Location	Distance from Site (km)	Note
The properties at Langley, to the west of Sutton Lane	500 m to southwest	Low flood risk from the Site since the Site drains away from the properties.
The railway line connecting Bristol - Paddington	20 m to north	Low flood risk from the Site since the Site drains away from the railway.
Thorney Lane Business Park	50 m to north	Low flood risk from the Site since the Site drains away from the properties.
The properties at Langley to the west of Market Lane	200 m to southwest	Low flood risk from the Site since the Site drains away from the properties.
The properties at Richings Park	50 m to southeast and 200 m to east	Low flood risk from the Site since the Site drains away from the properties.
Richings Park Golf Club	300 m to south	Low flood risk from the Site since the Site drains away from the properties.

6.2 Catchment areas

The Site can be considered as one catchment, with an area of 37 Ha.

The present land use of the quarry is predominantly agriculture. The land will be restored back to agriculture following the importation of inert materials and restoration of subsoils and topsoils stripped from the Site at the commencement of operations.

6.3 Climate change

Projections of future climate change in the UK indicate more frequent, short-duration, high-intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the National Planning Policy Framework (DGLG, 2012) recommends that the effects of climate change are incorporated into Flood Risk Assessments. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are provided by the Environment Agency (Environment Agency, 2016). The recommended national precautionary sensitivity range for peak rainfall intensity is shown in Table 6.2 where the “Central” and “Upper end” estimates have probabilities of 50% and 10% respectively (i.e. there is only a 10% chance that the increase in rainfall will exceed 40% by 2115).

The climate change guidance suggests that the Central estimate be used for planning but that the potential effect of a change as great as the Upper end estimate be checked to assess the consequences should it occur.

Table 6.2 National precautionary sensitivity ranges for peak rainfall intensity

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Peak runoff is similarly expected to increase as a result of climate change. However, the Environment Agency advises it is not necessary to consider allowance for water compatible development within flood zone 1 or 2 in the Thames catchment.

Since the Site is intended to be worked in the near future and over a relatively short period the consequences of climate change on rainfall for the operational phase are very limited. However, in order to provide long term betterment for downstream properties the surface runoff management scheme has been designed to accommodate the 20% central rainfall estimate of climate change to 2115. The consequences of a larger increase in rainfall intensity would be to reduce the betterment provided, but this will still be an improvement on the runoff without the proposed development at the Site.

Following the restoration phase, when the quarry void will be filled to the proposed restoration level, surface runoff will therefore be limited to present greenfield rates, allowing for a 20% increase in rainfall, by providing attenuation. Details of these calculations are described below.

6.4 Surface run-off calculation during the excavation and restoration phases

Catchment runoff has been estimated using IH124 methodology (Institute of Hydrology, 1994) as follows:

$$Q_{bar}(rural) = 0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$$

Where:

Qbar (rural) is the mean annual flood,

AREA is site area, 37 Ha,

SAAR is standard annual average rainfall (639 mm at the Langley site) and

SPR is standard runoff percentage, derived from soil characteristics (0.3 for Greenfield).

The IH124 methodology uses an estimate of runoff percentage (SPR) based on soil type, with soils classed from 1 (highly permeable e.g. chalk) to 5 (non-permeable e.g. rock). The estimates in Table 6.3 use a SPR of 0.3, based on a mapped natural soil type 2 (sandy soil). To estimate the runoff percentage likely for the restored area the soil type will remain unchanged as run-off will occur in the restored mixed subsoils and topsoils which will be temporarily stored in the screening bund and then replaced in the final layer of restoration as discussed in Section 3.1.1.

Table 6.3 Estimated Greenfield Surface Run-off Rates

IH124 Calculation of Greenfield Runoff Rates			
Langley Quarry			
Catchment area		370,000	m ²
Catchment area	AREA	37	Ha
Standard Annual Rainfall	SAAR	639	mm
Standard Percent Runoff	SPR	0.3	
Calculated Value:			
Mean Annual Flood	Qbar	0.063	m ³ /s
Mean Annual Flood		62.6	l/s
Return Period Peak Flows			
Return Period	Growth Factor	Peak Flow	
1year	0.85	53	l/s
10 year	1.62	101	l/s
30 year	2.3	144	l/s
100 year	3.19	200	l/s

The peak greenfield runoff rate for the 1 in 100 year event is therefore expected to be 200 l/s from the entire Site. The runoff from the restored Site should therefore be limited to this value through the use of attenuation storage.

6.5 Flood risk due to the excavation and restoration phase

The quarry will be worked wet and the quarry void will be filled with water during the operational and restoration phases. The quarry void will not have a surface water discharge point and will not drain directly to surface watercourses. It is assumed that the water stored in the quarry void will be in hydraulic connectivity with the underlying groundwater until such time as the side wall geological barriers are constructed and thereafter controlled by pumping. Pumped water will be discharged back to ground. Therefore the quarry voids represent a reduction in the Greenfield runoff rate compared to the pre-existing condition. Table 6.3 shows the Greenfield runoff rate estimated from these areas using IH124 methodology as described above. The operational phase is therefore expected to reduce surface runoff in local watercourses during storm events by up to 53 l/s in a one year storm and 200 l/s in a 100 year (1%) storm.

6.6 Flood Risk following restoration

The restored Site will be filled in with inert material and will be raised to no greater than the original ground level. The original subsoils and topsoils will be replaced above the inert fill material to restore the Site to high grade agricultural land. Surface run-off will occur within the restoration soils as at present although it will not infiltrate into the less permeable infill material.

Most rainfall will be absorbed by the agricultural soils but surface water from extreme rainfall events will drain to Horton Brook and be intercepted by ditches and a series of shallow ponds constructed adjacent to Horton Brook as shown on the restoration Plan (Appendix D).

The surface runoff following restoration has been calculated for the proposed restoration scheme, including a 20% increase for climate change, and maintains the current Greenfield run-off by providing attenuation storage for the expected increase.

A drainage strategy is therefore proposed in the next Section which will ensure Greenfield runoff rates are maintained.

7 SURFACE WATER DRAINAGE PLAN

7.1 Run-off Management

Section 6 indicates that the peak runoff rate from the proposed restoration will be designed to maintain the Greenfield run-off rate. The increase in runoff volume for the proposed restoration scheme is taken as 20% as a result of an allowance for rainfall increases due to climate change. To mitigate the effect of this increase it is proposed to intercept surface runoff from the restored site in a ditch running parallel to the Horton Brook and direct it to attenuation ponds beside the Horton Brook.

These ponds will be situated outside Flood Zone 3. They will store surface runoff and will discharge at a controlled rate, not exceeding the current Greenfield rate, via a ditch to the Horton Brook at the southern extremity of the Site.

7.2 Drainage Ditches

Surface runoff from the Site will be intercepted by a drainage ditch which runs parallel to the Horton Brook, between the agriculture restoration and Flood Zone 3 areas. The peak flow for a 1 in 100 year event has been calculated to be 200 l/s and, allowing for a 20% increase due to climate change, the ditch will be required to discharge a peak flow of 240 l/s at the downstream end. The 1 in 100 year peak flow for parts of the ditch towards the north (upstream) end of the Site will be proportionally less, but 240 l/s has been taken as the design flow throughout.

The longitudinal slope along the length of the ditch is fairly constant at 0.0156. Assuming an average roughness (Manning's n) of 0.03, a ditch with 0.5 metre bottom width and approximately vertical sides could accommodate a flow of 240 l/s with a normal depth of 0.34 meters. The interception ditch at the lower end of the Site should therefore have minimum dimensions 0.5 metre square, though a smaller ditch would be adequate at the upper end of the Site.

The ditch will ultimately discharge to the Horton Brook at the downstream (southern) end of the Site. The ditch at this location should have a flow control device, such as a weir or sluice, to ensure the peak discharge is no greater than 200 l/s, the current Greenfield runoff rate for the 1 in 100 year event. Flows in excess of this rate will be stored in the ditch and in the proposed ponds and wetland areas within the Site.

7.3 Attenuation Ponds

Two ponds, within wetland areas, are proposed in the Site partway up the Horton Brook with a third pond at the southern end. These ponds are largely for habitat purposes, but will also attenuate runoff in extreme events. The minimum storage requirement to provide the attenuation needed has been calculated for the critical event as determined in Table 7.1.

Table 7.1 Attenuation Storage Requirement

Langley Quarry - Critical Duration for Attenuation						
North of Horton Brook						
Duration (h)	1 in 100 Rainfall (mm)	Rainfall + 20% cc (mm)	Effective Rainfall (mm)	Runoff (m3)	Vol discharged over duration (m3)	Attenuation required (m3)
2.5	44.3	53.1	15.9	5898.9	1798.6	4100
3	50.6	60.7	18.2	6736.1	2158.4	4578
4	57.7	69.3	20.8	7687.5	2877.8	4810
6	65.9	79.1	23.7	8778.5	4316.7	4462
10	75.2	90.3	27.1	10021.7	7194.6	2827

In Table 7.1 rainfall totals have been obtained from FEH for a range of durations and a 20% increase applied to allow for potential climate change. The volume from runoff is derived for

this rainfall, assuming the 0.3 runoff coefficient used previously and compared to the volume that will be discharged from the site over the rainfall duration period, assuming discharge at the limiting rate of 200 l/s.

This shows that the maximum attenuation storage is required for the 4 hour rainfall event, when 4810 m³ of storage are required. As shown in Appendix D, the ponds will be surrounded by wetland which is intended to be flooded in very wet weather. The total area of wetland and pond provided in the restoration plan is approximately 7.2 Ha: This could accommodate the 4810 m³ required with a level increase of only 6 mm so there is ample storage provided in the Restoration plan to hold excess runoff during the 1 in 100 year event.

8 CONCLUSIONS

It is proposed to extract sand and gravel from land formerly known as Langley Airfield. The proposal includes an extraction phase of sand and gravel for next 9 years followed by restoration with imported inert waste, back to original ground levels, to restore the site to agricultural use. The area of the Site is 37 ha and is currently used for agriculture.

Horton Brook flows diagonally from northwest to the southeast of the Site. A small part of the Site is located in the flood plain of Horton Brook. A strip of land both side of the brook lies in Flood Zone 3 which has high risk of fluvial flooding. The majority of the Site lies in Flood Zone 1 which has low risk of fluvial flooding. The surface water and groundwater flood risk to the Site is low to moderate. The risk of flooding in the event of reservoir failure is identified as high along the Horton Brook.

The proposal is appropriate to develop, as per NPPF, as it is a water compatible development and no exception test is required, provided suitable flood mitigation measures are in place.

An emergency evacuation and safe egress route is located to the northeast and west of the Site. A minimum standoff of 30 m is recommended from the bank of Horton Brook and will in any case be required due to the oil and gas pipelines which run between the Horton Brook and the proposed development area.

Provision of a noise bund is outlined in the development plan. This is located outside of flood zone 2 and 3.

During the excavation phase, the Site will create a large void. The excavations in the Site do not include raising of the ground surface within flood zone 3. The excavated sand and gravel will be transported to the Processing Plant which lies in Flood Zone 1. A flood warning system is to be employed to ensure the operation is worked in a safe manner.

Following excavation a side wall geological barrier will put in place around each of the phases with selected imported inert waste. Following this the remaining void will be filled with imported inert materials. The original sub and top soils will be placed as the final restoration layer returning the site to original ground levels and the existing high grade agricultural use. The placement of the geological barrier and inert waste will have no impact on reduction of flood plain storage. Therefore no compensatory flood storage is required during the operation and restoration phases.

The quarry will be worked wet and the run-off generated during the operational phase will be stored in the quarry void. The operational phase is expected to reduce surface runoff to the local watercourses during storm events by up to 53 l/s in a one year storm and 200 l/s in a 100 year (1%) storm.

During the restoration phase, surface run-off from the Site is estimated to increase 20% over Greenfield run-off volume. This is due to allowance of climate change after restoration. The increase in surface run-off during restoration plan needs to be attenuated on site to maintain Greenfield run-off.

A drainage strategy is presented to intercept surface runoff using a small ditch between the Horton Brook and the restored agricultural area and provide storage within ponds and wetlands on the Site. After attenuation flow will be released to Horton Brook at a rate not more than the Greenfield run-off rate.

The flood mitigation measures and drainage strategy described in the report will be sufficient to mitigate any onsite and offsite flood risk during operation and after restoration of the Site.

9 REFERENCES

BGS, 2015. Geindex onshore geology viewer. Site accessed September 2015 from:

<http://mapapps2.bgs.ac.uk/geoindex/home.html>

Cemex, 2012. Borehole logs data, Langley Quarry, Slough, Berkshire

DEFRA 2015 Non-statutory technical standards for Suds Department for Environment, Food and Rural Affairs (March 2015).

Department for Communities and Local Government (2012). National Planning Policy Framework (NPPF).

Department for Communities and Local Government (2014). Planning Practice Guidance (PPG).

Environment Agency, 2015. Product 4 flood data (Reference: HNL48678/AS)

Environment Agency 2016 Flood risk assessments: climate change allowances.

Published online on 19th February 2016 at <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

ESI, 2016 Langley Quarry – Hydrogeological Impact Assessment, Report Reference: 64036R1.

Institute of Hydrology, 1994. Flood estimation for small catchments.

Jacobs, 2011. Buckinghamshire County Council's SFRA for minerals and waste local development framework

NERC, 2009. WINFAP-FEH CD-ROM version 3.0.

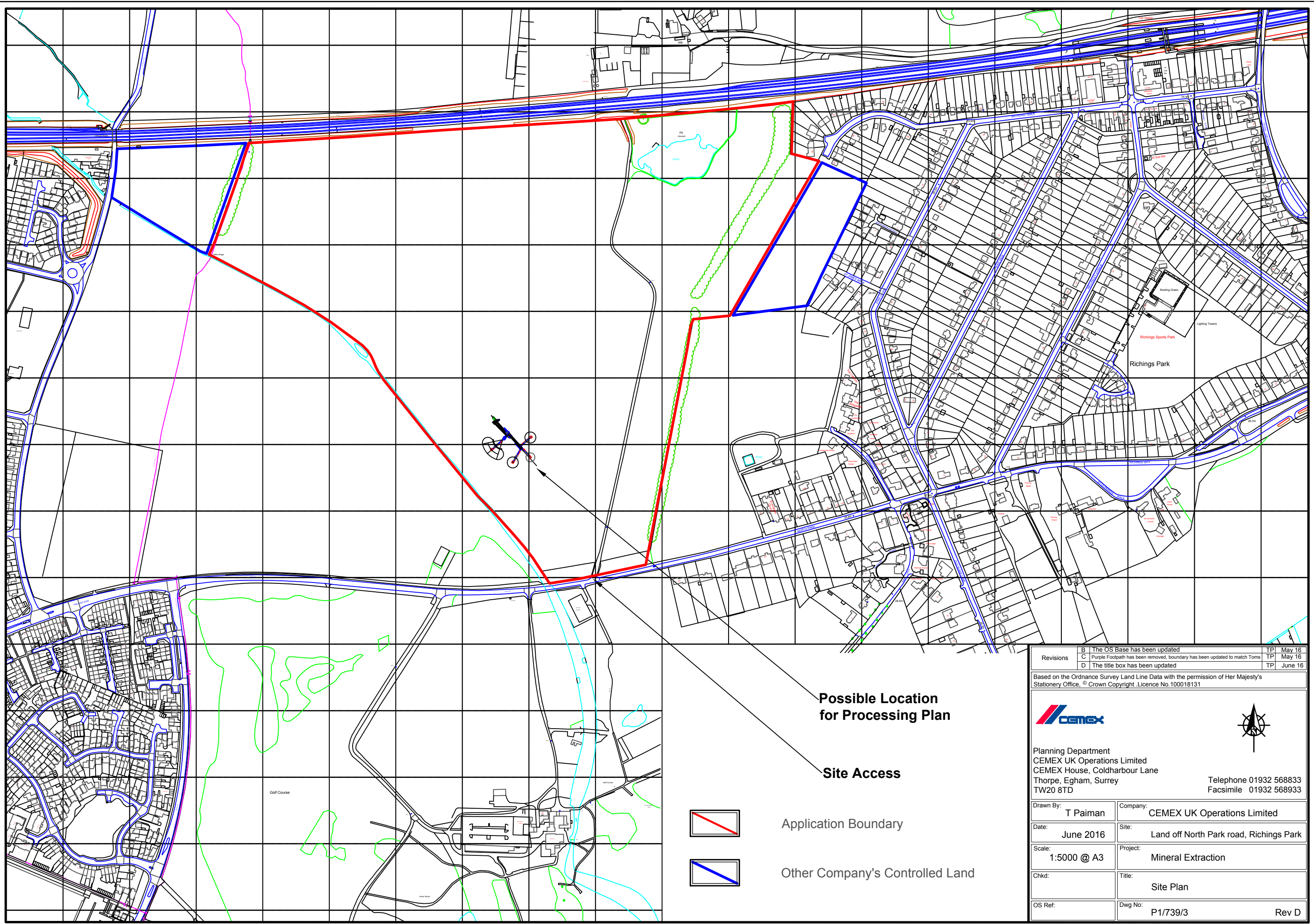
NSRI, 2014. LandIS *Soilscapes* Viewer [online] Available at

<http://www.landis.org.uk/soilscapes/>

APPENDICES

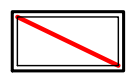
APPENDIX A

Drawing P1-739-3D

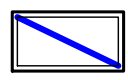


Possible Location
for Processing Plan

Site Access





Application Boundary



Other Company's Controlled Land

Revisions	B The OS Base has been updated	TP	May 16
	C Purple Footpath has been removed, boundary has been updated to match Toms	TP	May 16
	D The title box has been updated	TP	June 16

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Planning Department
 CEMEX UK Operations Limited
 CEMEX House, Coldharbour Lane
 Thorpe, Egham, Surrey
 TW20 8TD

Telephone 01932 568833
 Facsimile 01932 568933

Drawn By:	T Paiman	Company:	CEMEX UK Operations Limited
Date:	June 2016	Site:	Land off North Park road, Richings Park
Scale:	1:5000 @ A3	Project:	Mineral Extraction
Chkd:		Title:	Site Plan
OS Ref:		Dwg No:	P1/739/3
			Rev D

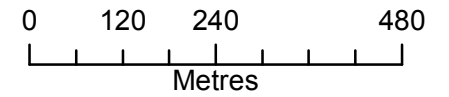
APPENDIX B

Environment Agency Product 4 Flood Data

Flood Map for Planning centred on 502828, 179495 - 15/09/2015 - HNL48678/AS



Environment Agency
 2 Bishops Square Business Park
 St Albans Road West
 Hatfield
 Hertfordshire
 AL10 9EX



Legend

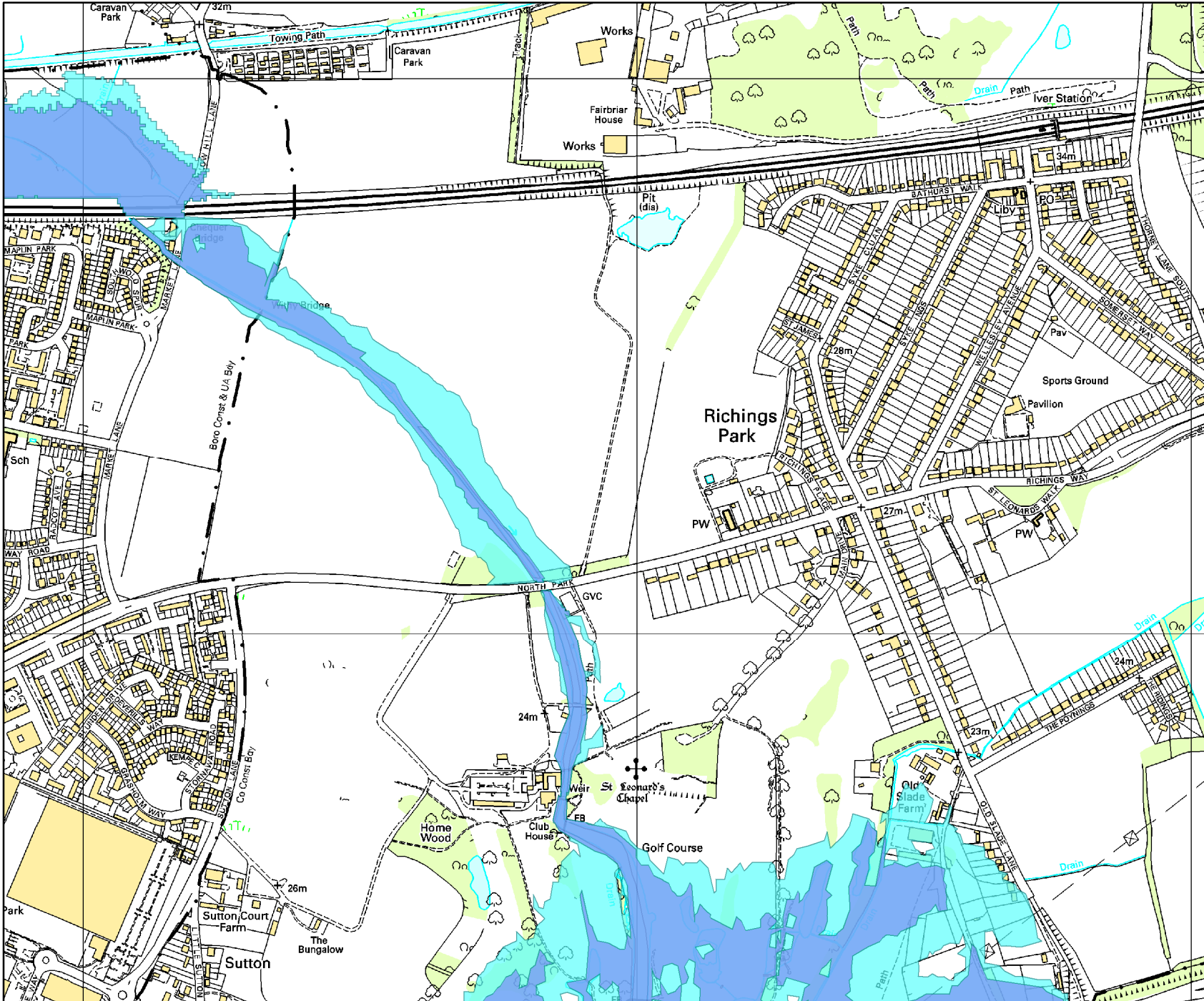
- Main Rivers
- Flood Map for Planning**
- Flood Storage Area
- Areas Benefiting from Flood Defences
- Flood Zone 3
- Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
 - from the sea with a 1 in 200 or greater chance of happening each year
 - or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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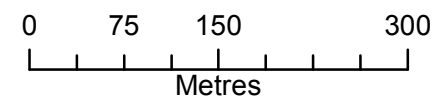


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Detailed FRA centred on 502828, 179495 - 15/09/2015 - HNL48678/AS



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Legend

— Main Rivers

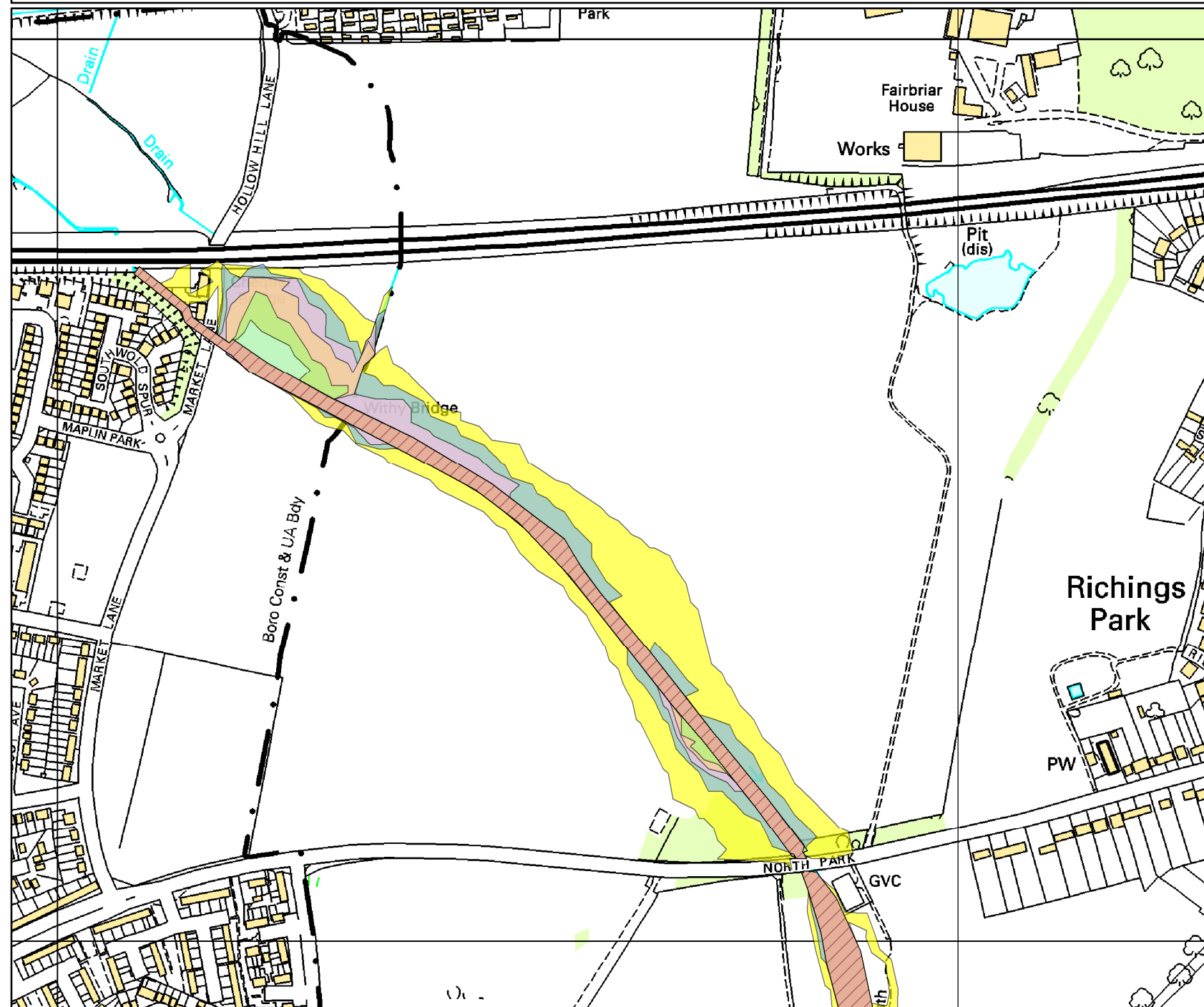
Defended Flood Outlines

- 1 in 2 (50%) Defended
- 1 in 5 (20%) Defended
- 1 in 10 (10%) Defended
- 1 in 20 (5%) Defended
- 1 in 50 (2%) Defended
- 1 in 100 (1%) Defended
- 1 in 100+20% (*CC) Defended
- 1 in 1000 (0.1%) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences.

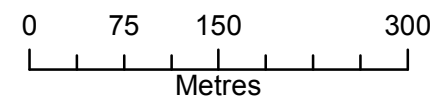
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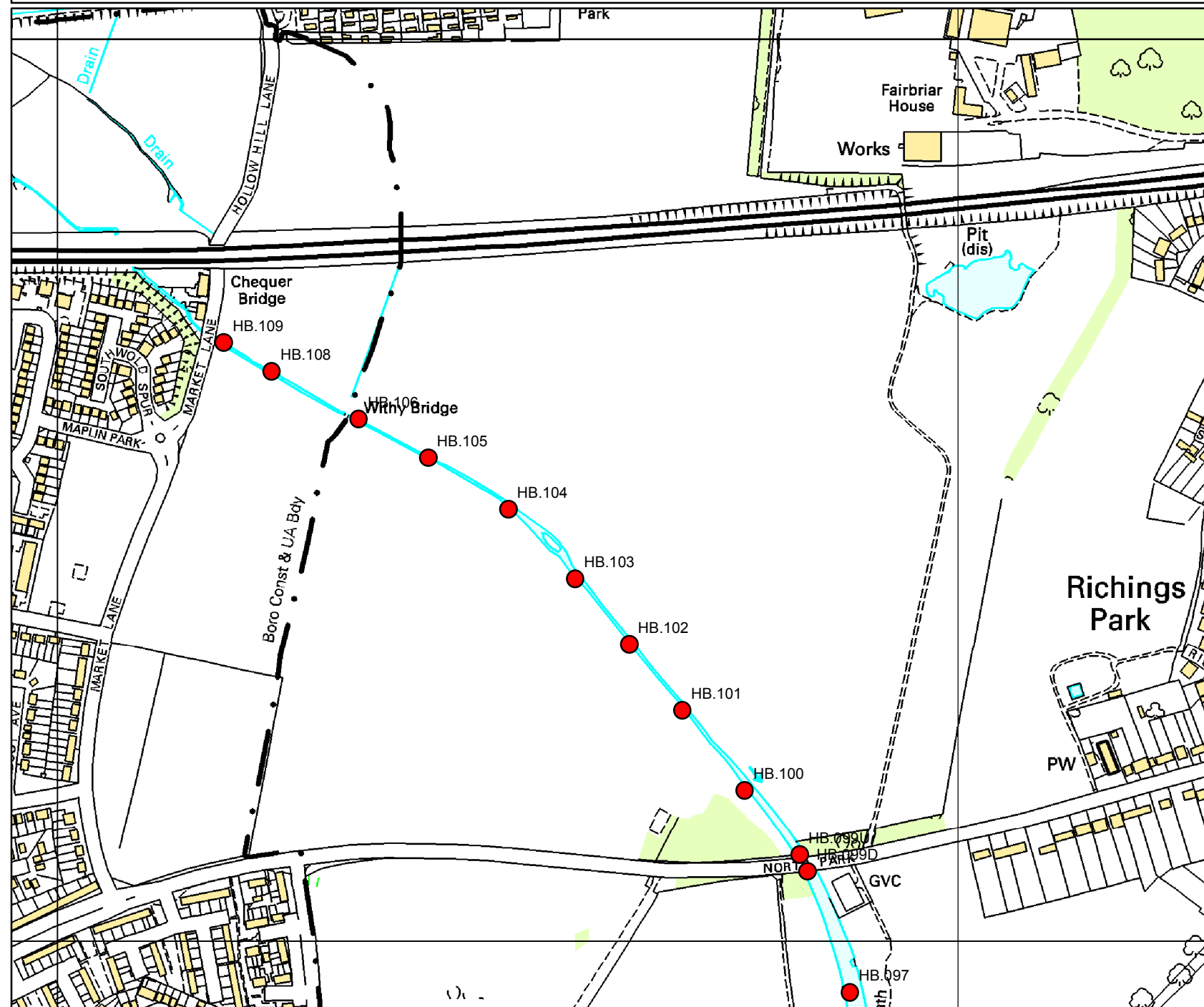


Legend

Main Rivers

1D Node Results

Node Results



The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences.

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Environment Agency ref: HNL48678/AS

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

All flood levels are given in metres Above Ordnance Datum (mAOD)

All flows are given in cubic metres per second (cumecs)

MODELLED FLOOD LEVEL

Node Label	Easting	Northing	Return Period							
			2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	100 yr + 20%	1000 yr
HB.097	502880	178942	22.55	22.59	22.64	22.71	22.77	22.85	22.94	23.13
HB.099D	502833	179076	23.02	23.06	23.12	23.18	23.25	23.32	23.41	23.58
HB.099U	502824	179095	23.07	23.13	23.20	23.29	23.41	23.57	23.79	24.46
HB.100	502763	179166	23.37	23.43	23.49	23.57	23.65	23.76	23.92	24.51
HB.101	502694	179255	23.43	23.49	23.56	23.64	23.73	23.84	23.98	24.53
HB.102	502635	179328	23.49	23.56	23.64	23.72	23.82	23.92	24.06	24.56
HB.103	502575	179401	23.76	23.82	23.89	23.97	24.06	24.15	24.27	24.65
HB.104	502501	179478	24.16	24.21	24.27	24.34	24.42	24.50	24.60	24.86
HB.105	502412	179535	24.45	24.50	24.57	24.65	24.73	24.82	24.92	25.14
HB.106	502335	179578	24.70	24.77	24.86	24.95	25.04	25.13	25.23	25.41
HB.108	502238	179631	24.85	24.92	25.00	25.09	25.18	25.27	25.36	25.55
HB.109	502185	179663	25.10	25.17	25.26	25.35	25.44	25.53	25.62	25.81

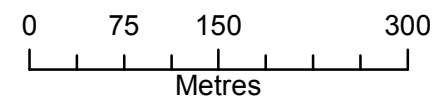
MODELLED FLOWS

Node Label	Easting	Northing	Return Period							
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HB.097	502880	178942	1.60	1.90	2.29	2.76	3.33	3.98	4.79	6.61
HB.099D	502833	179076	1.60	1.90	2.29	2.76	3.33	3.98	4.79	6.71
HB.099U	502824	179095	1.60	1.90	2.29	2.76	3.33	3.98	4.79	6.71
HB.100	502763	179166	1.60	1.90	2.29	2.76	3.33	3.98	4.77	6.22
HB.101	502694	179255	1.60	1.90	2.29	2.77	3.33	3.98	4.78	6.55
HB.102	502635	179328	1.60	1.90	2.29	2.77	3.33	3.99	4.83	6.89
HB.103	502575	179401	1.60	1.90	2.29	2.77	3.33	3.99	4.83	7.08
HB.104	502501	179478	1.60	1.90	2.29	2.77	3.33	3.99	4.84	7.14
HB.105	502412	179535	1.60	1.90	2.29	2.77	3.33	3.99	4.79	7.00
HB.106	502335	179578	1.60	1.90	2.29	2.77	3.33	4.00	4.85	7.04
HB.108	502238	179631	1.60	1.90	2.29	2.77	3.30	3.91	4.63	6.61
HB.109	502185	179663	1.60	1.90	2.30	2.80	3.40	4.10	4.92	7.40

Detailed FRA centred on 502828, 179495 - 15/09/2015 - HNL48678/AS



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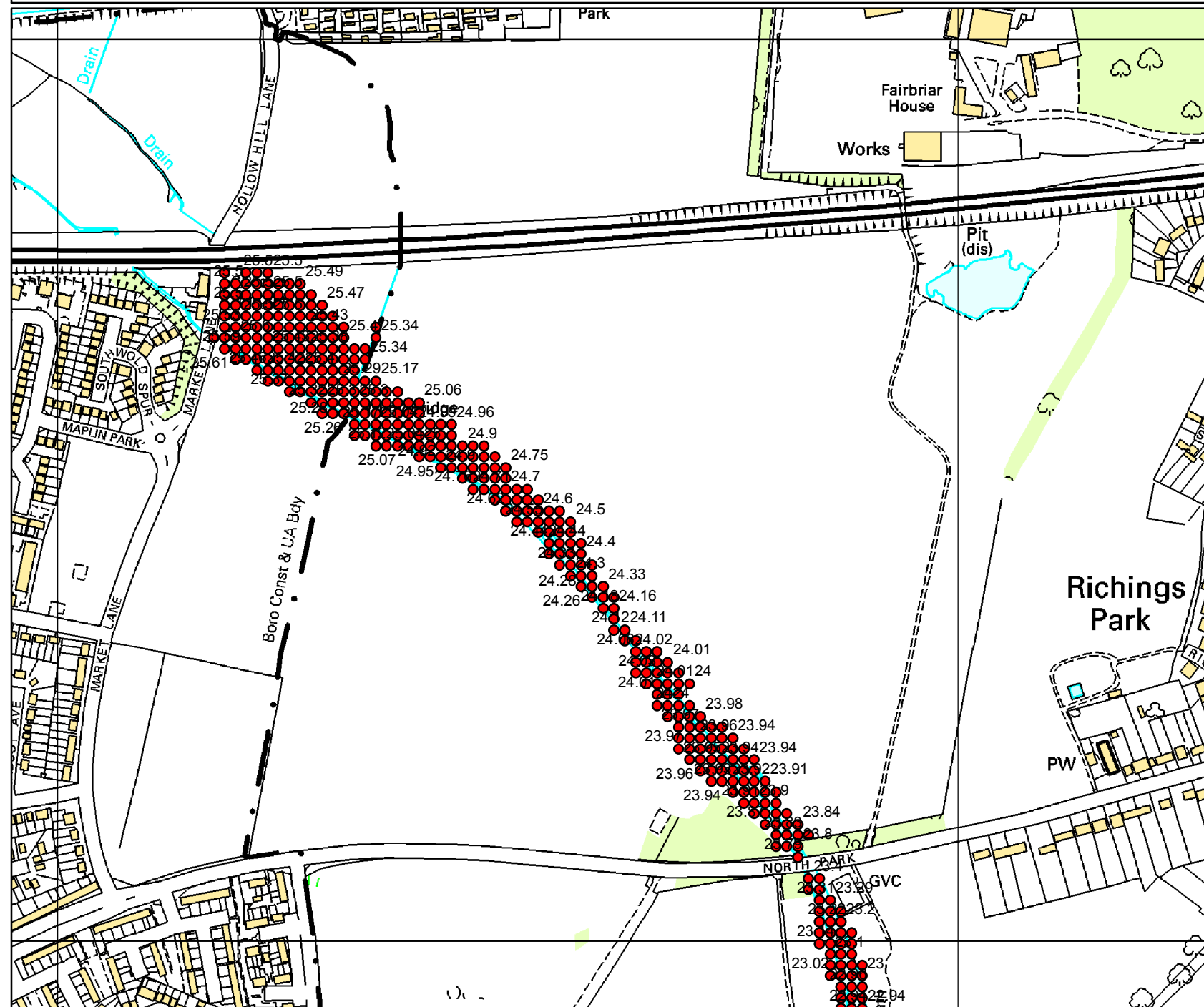


Legend

Main Rivers

2D Node Results: Heights

1 in 100+20% (*CC) Defended



The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

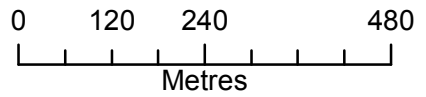
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences.

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Historic Flood Map centred on 502828, 179495 - 15/09/2015 - HNL48678/AS



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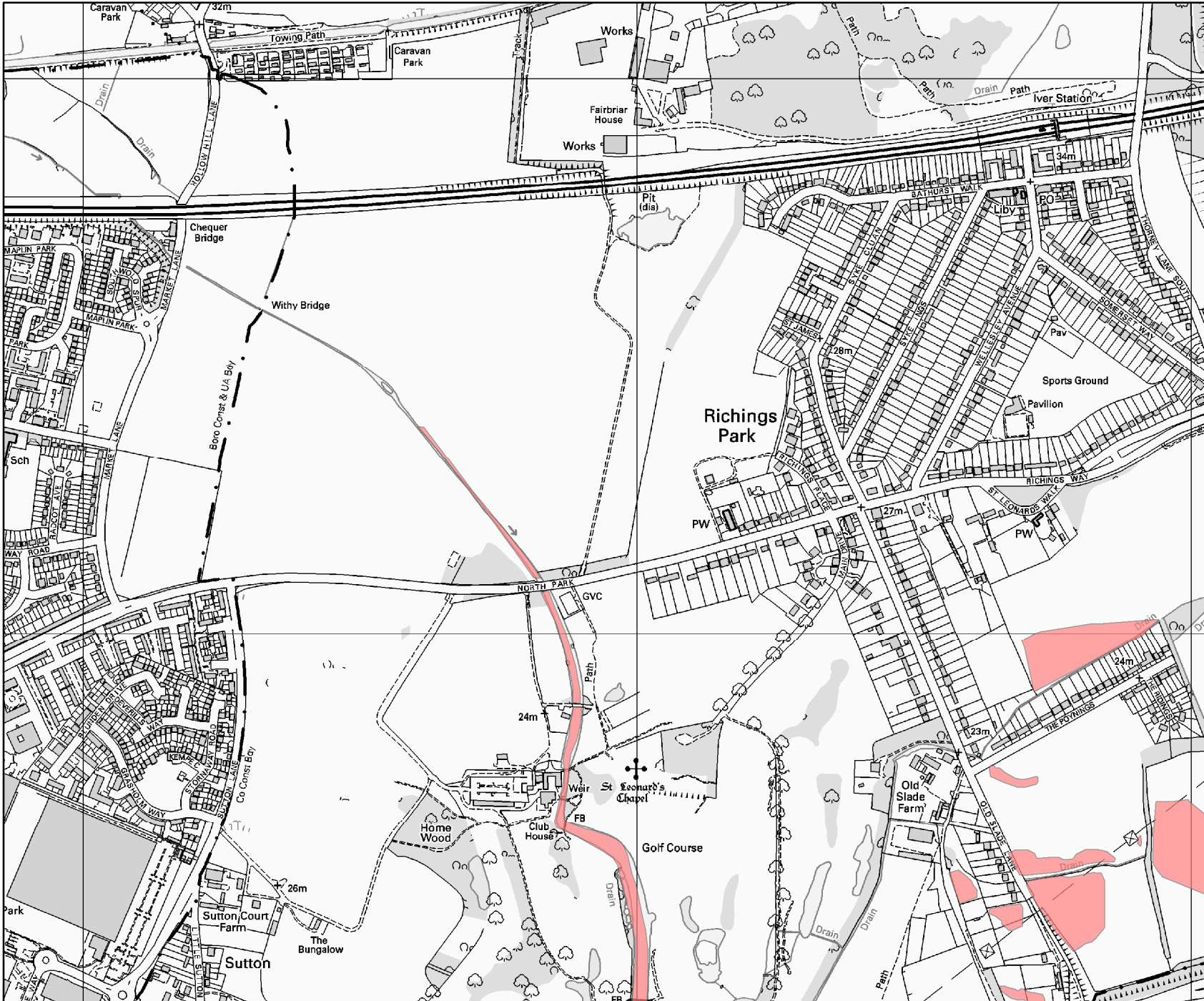


Legend

- Main Rivers
- Flood Event Outlines**
- 2003

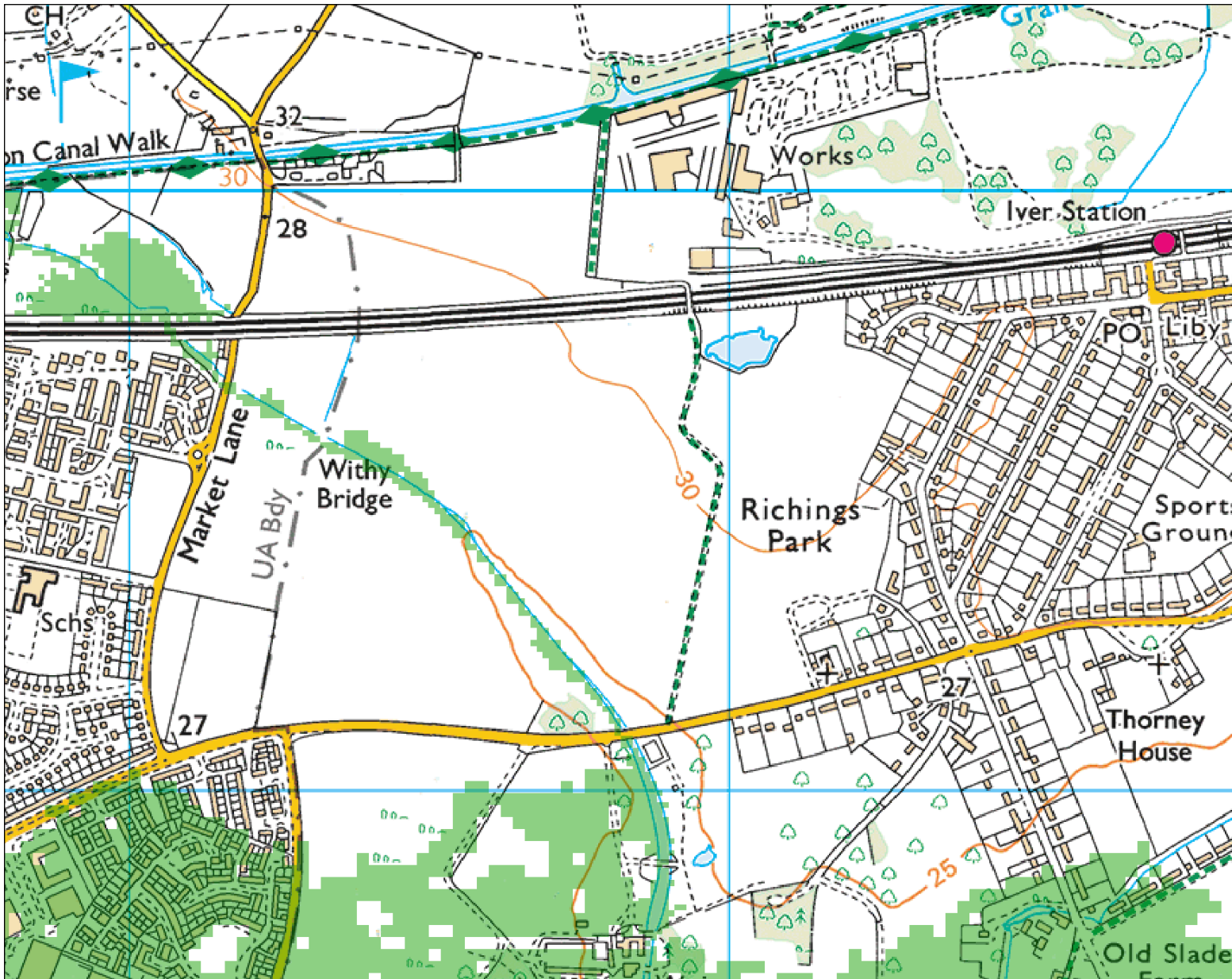
The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey. Our historic flood event outlines do not provide a definitive record of flooding. It is possible that there will be an absence of data in places where we have not been able to record the extent of flooding. It is also possible for errors occur in the digitisation of historic records of flooding.

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HNL48678/AS: Reservoir flood map for Langley Airfield, Langley, Ritchings Park, Slough



Scale 1:10,001



Likelihood of Flooding from Rivers and the Sea

 Risk of Flooding from Reservoirs

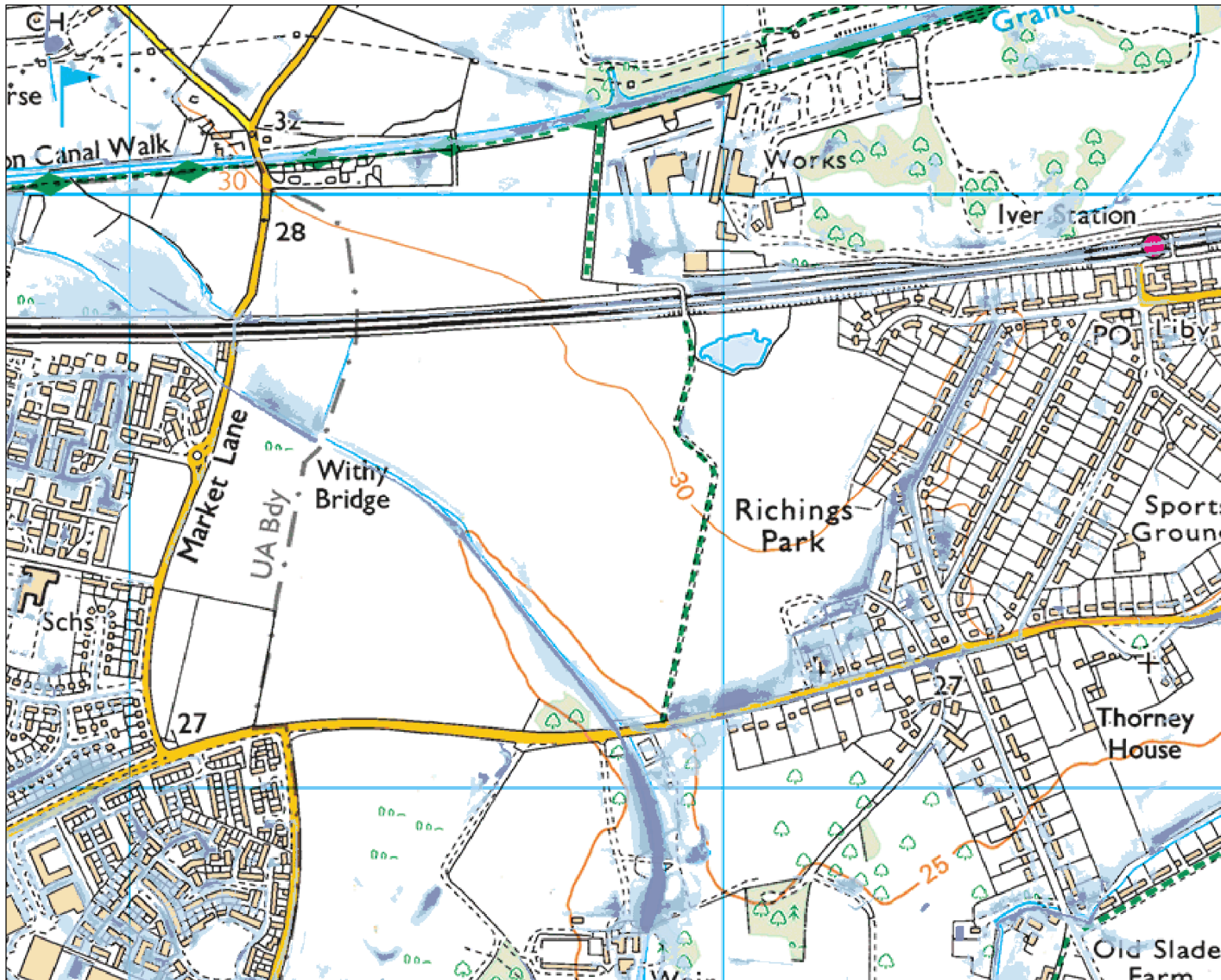
Likelihood of Flooding from Rivers and the Sea (taking into account defences)

- High: Greater than or equal to 1 in 30 (3.3%) chance in any given year
- Medium: Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year.
- Low: Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- Very Low: Less than 1 in 1,000 (0.1%) chance in any given year

This information is shown on the Risk of Flooding from Rivers & the Sea map on our website.

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Risk of flooding from Surface Water



Scale 1:10,001



Likelihood of flooding from Surface Water

- High
- Medium
- Low
- Very Low

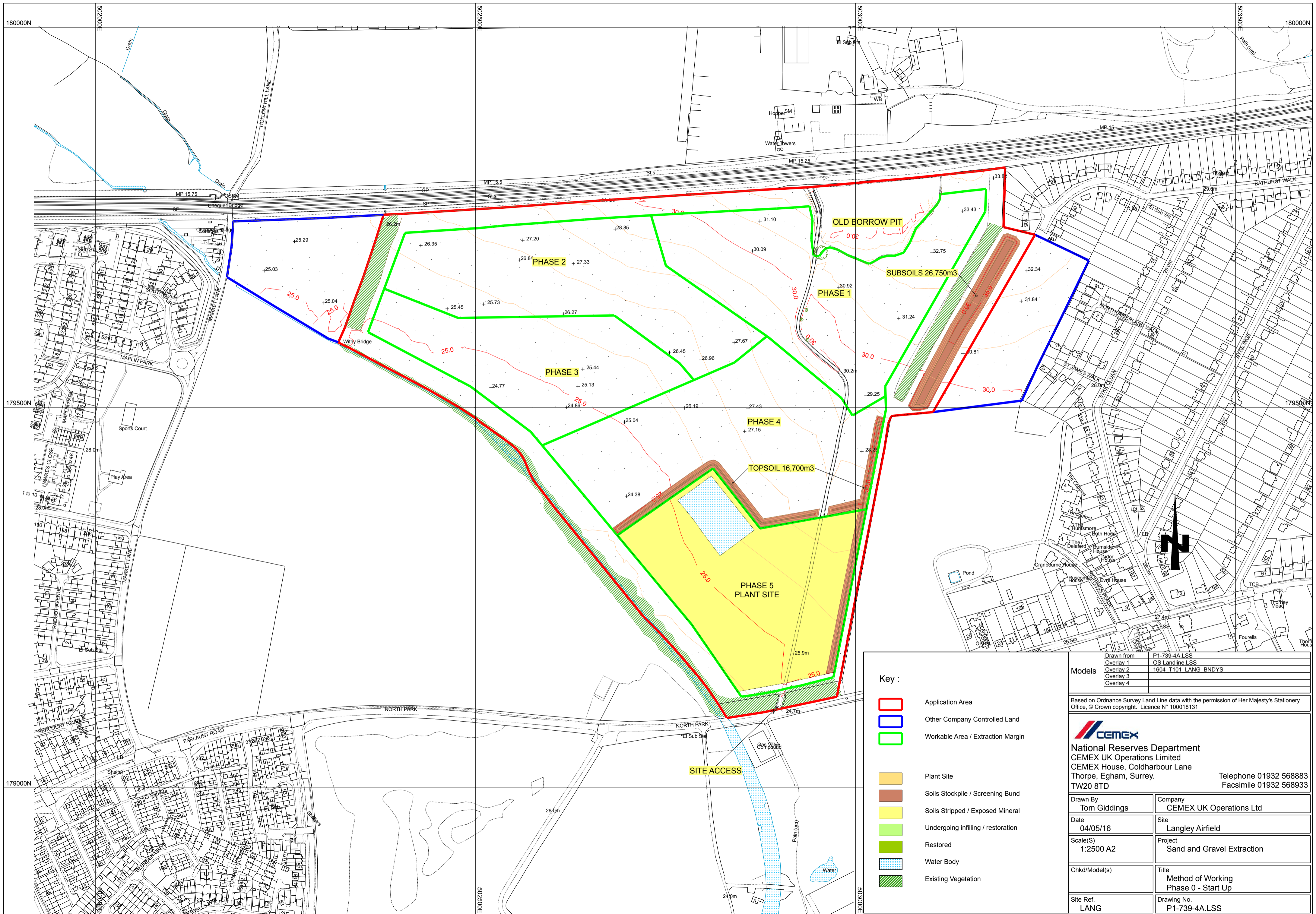
Likelihood of flooding from Surface Water

- High: Greater than or equal to 1 in 30 (3.3%) chance in any given year
- Medium: Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- Low: Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- Very Low: Less than 1 in 1,000 (0.1%) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

APPENDIX C

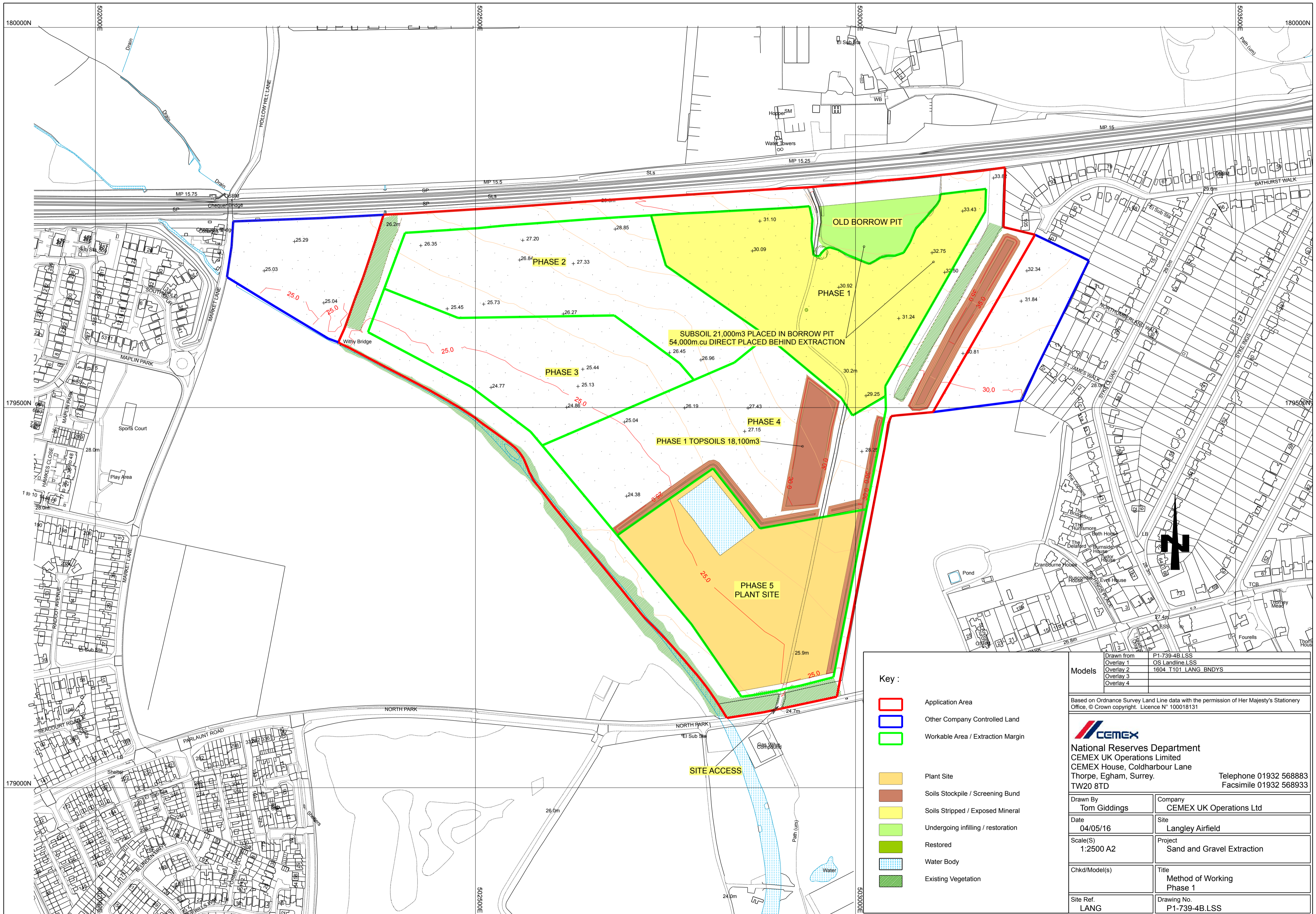
Working Plans



Key :

	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

Models	Drawn from P1-739-4A.LSS Overlay 1 OS Landline.LSS Overlay 2 1604 T101 LANG BNDYS Overlay 3 Overlay 4
Based on Ordnance Survey Land Line data with the permission of Her Majesty's Stationery Office, © Crown copyright. Licence N° 100018131	
National Reserves Department CEMEX UK Operations Limited CEMEX House, Coldharbour Lane Thorpe, Egham, Surrey. Telephone 01932 568883 TW20 8TD Facsimile 01932 568933	
Drawn By	Company
Tom Giddings	CEMEX UK Operations Ltd
Date	Site
04/05/16	Langley Airfield
Scale(S)	Project
1:2500 A2	Sand and Gravel Extraction
Chkd/Model(s)	Title
	Method of Working Phase 0 - Start Up
Site Ref.	Drawing No.
LANG	P1-739-4A.LSS



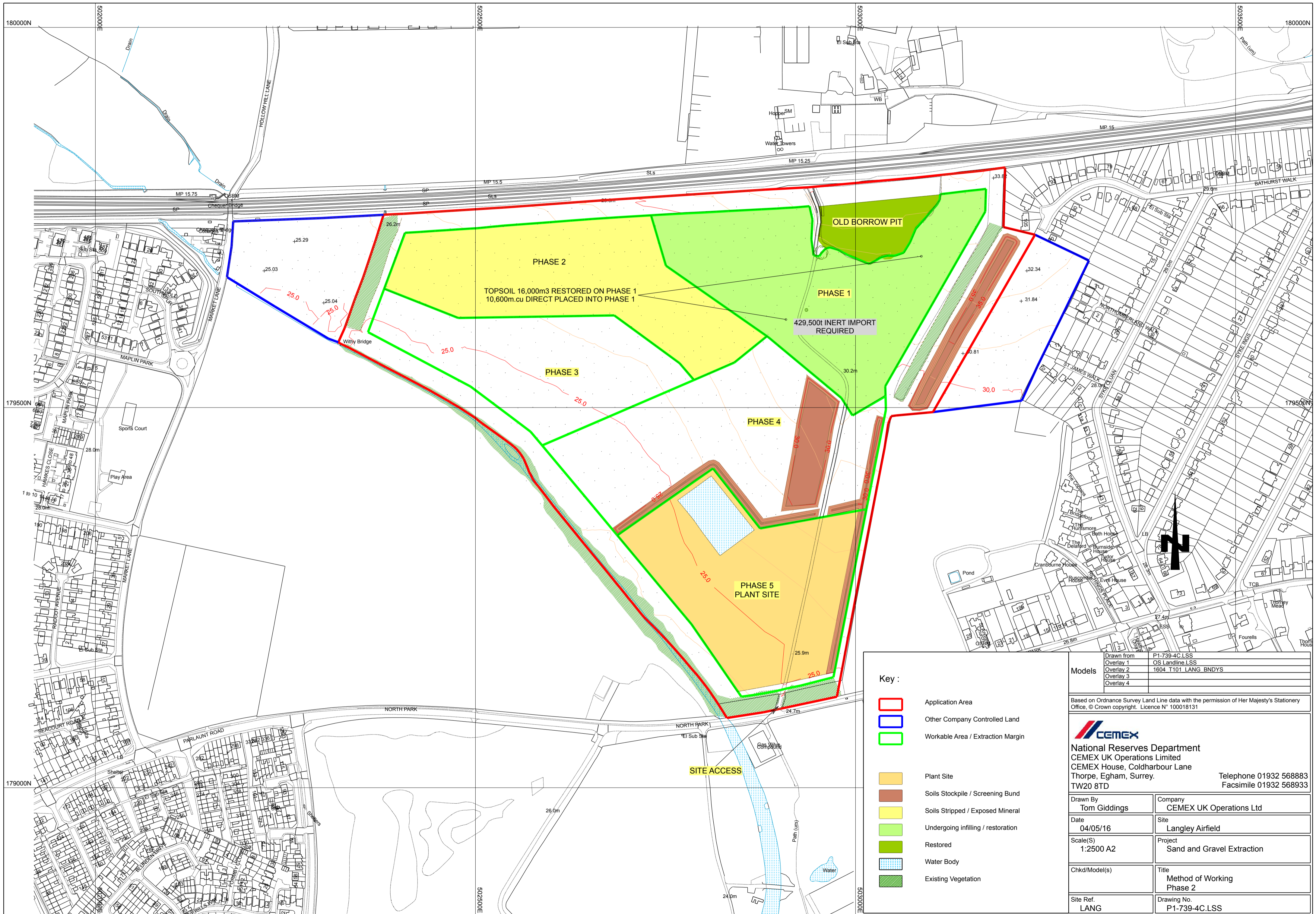
SUBSOIL 21,000m³ PLACED IN BORROW PIT
 54,000m³ DIRECT PLACED BEHIND EXTRACTION

PHASE 1 TOPSOILS 18,100m³

Key :

	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

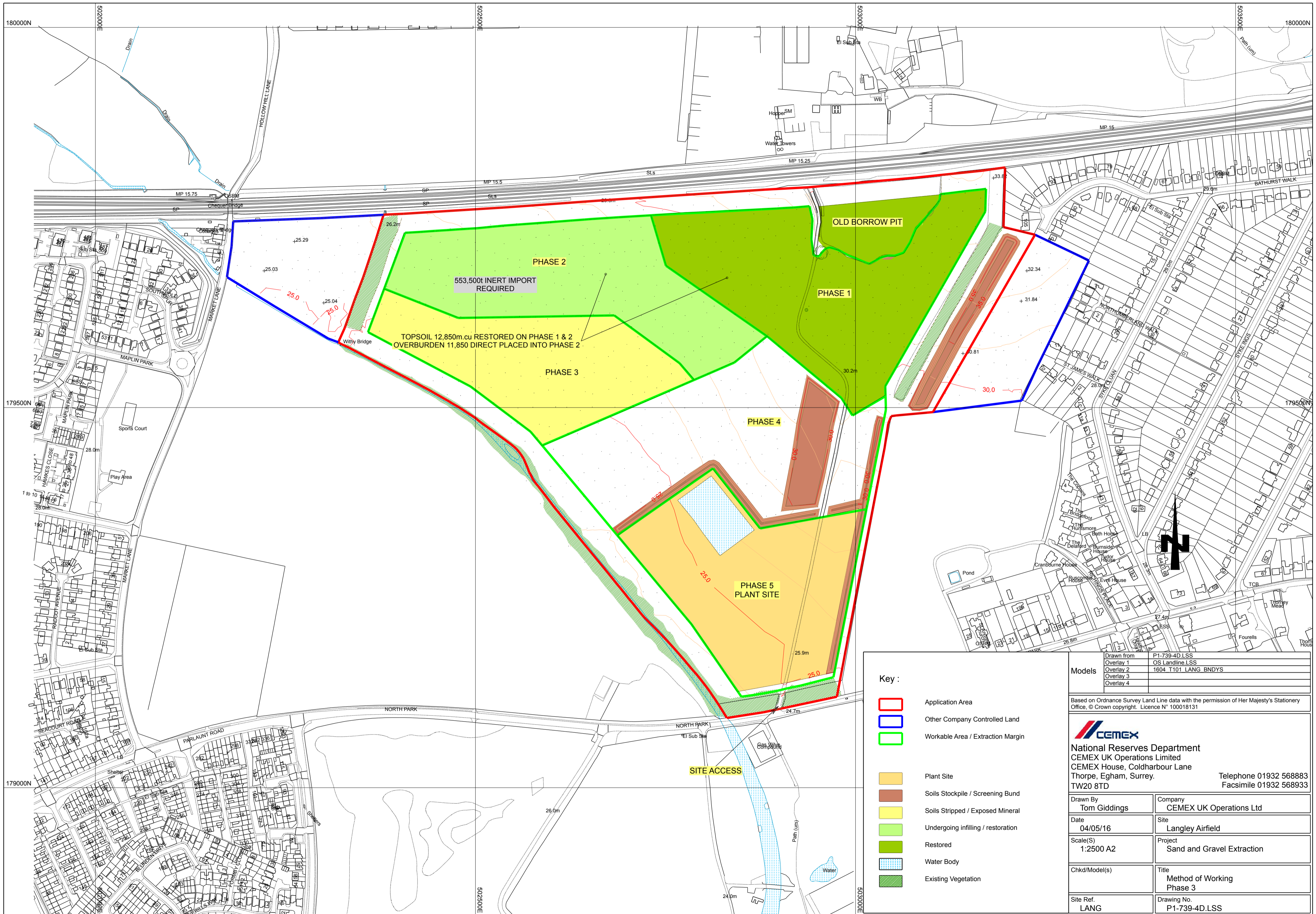
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Drawn By Tom Giddings	Company CEMEX UK Operations Ltd
Date 04/05/16	Site Langley Airfield
Scale(S) 1:2500 A2	Project Sand and Gravel Extraction
Chkd/Model(s)	Title Method of Working Phase 1
Site Ref. LANG	Drawing No. P1-739-4B.LSS



Key :


	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

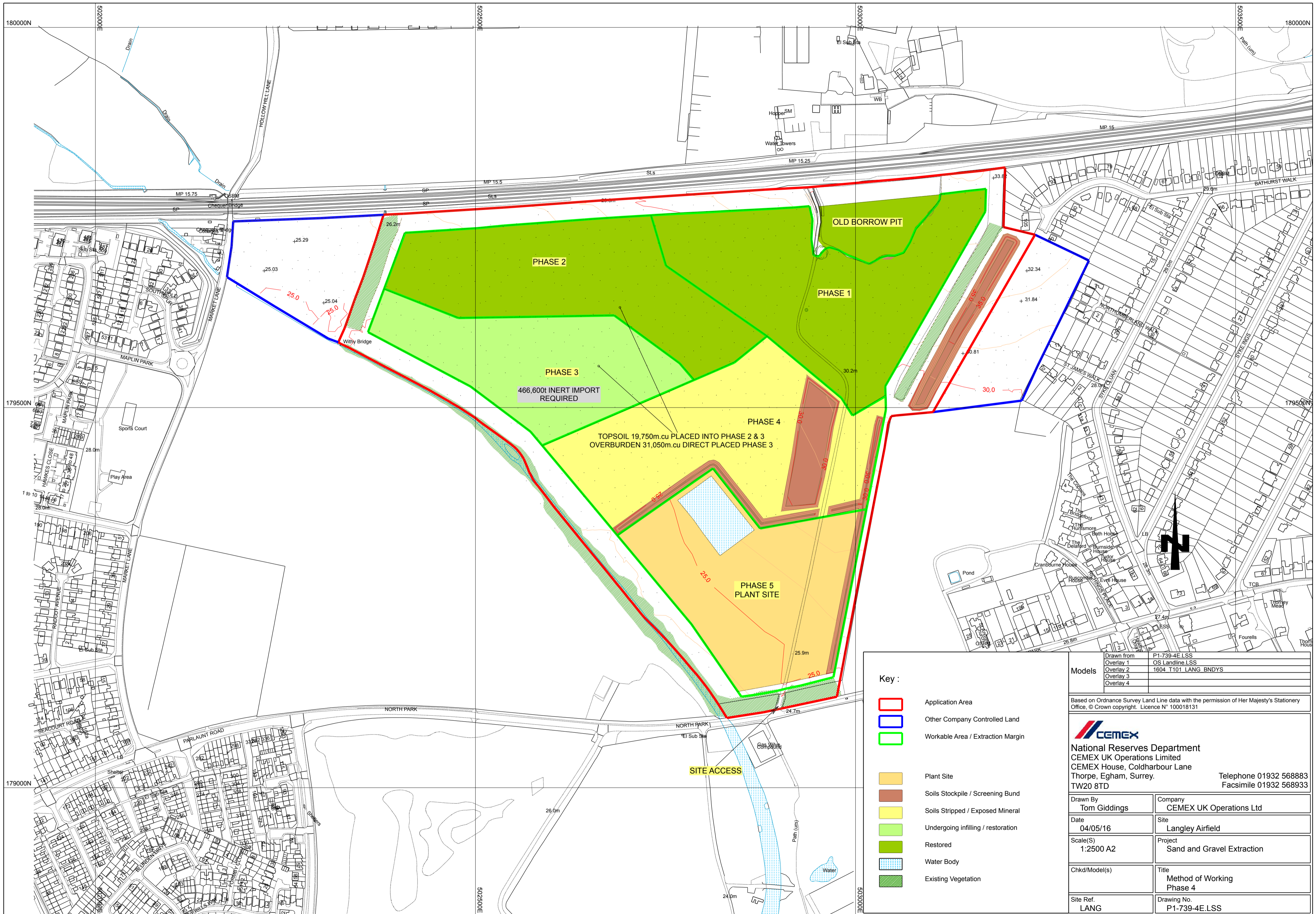
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Drawn By Tom Giddings	Company CEMEX UK Operations Ltd
Date 04/05/16	Site Langley Airfield
Scale(S) 1:2500 A2	Project Sand and Gravel Extraction
Chkd/Model(s)	Title Method of Working Phase 2
Site Ref. LANG	Drawing No. P1-739-4C.LSS



Key :

	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

Drawn from P1-739-4D.LSS Overlay 1 OS Landline.LSS Overlay 2 1604 T101 LANG BNDYS Overlay 3 Overlay 4	
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Drawn By Tom Giddings	Company CEMEX UK Operations Ltd
Date 04/05/16	Site Langley Airfield
Scale(S) 1:2500 A2	Project Sand and Gravel Extraction
Chkd/Model(s)	Title Method of Working Phase 3
Site Ref. LANG	Drawing No. P1-739-4D.LSS



Key :

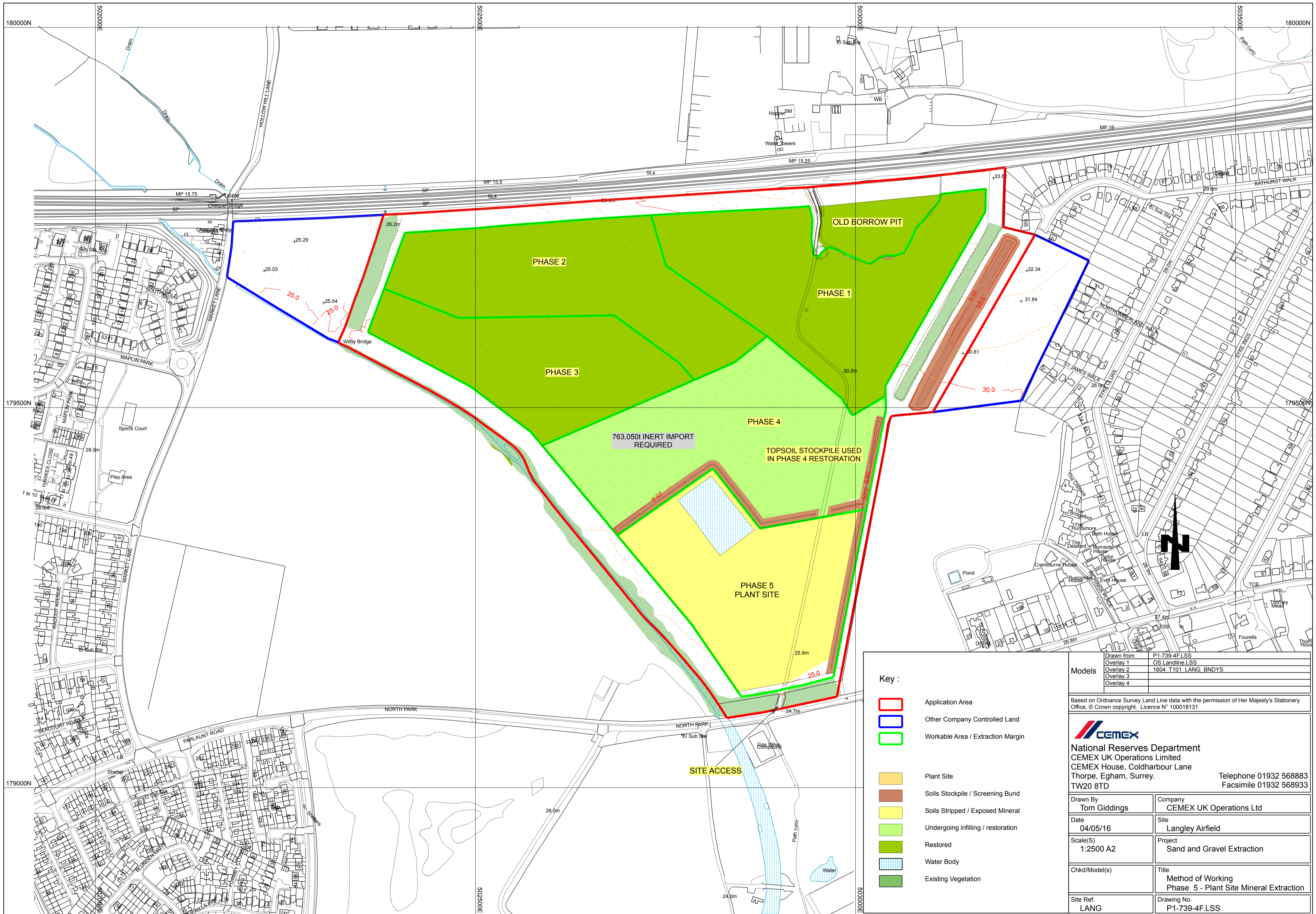
	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

Drawn from	P1-739-4E.LSS
Overlay 1	OS Landline.LSS
Overlay 2	1604 T101 LANG BNDYS
Overlay 3	
Overlay 4	

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Drawn By	Tom Giddings	Company	CEMEX UK Operations Ltd
Date	04/05/16	Site	Langley Airfield
Scale(S)	1:2500 A2	Project	Sand and Gravel Extraction
Chkd/Model(s)		Title	Method of Working Phase 4
Site Ref.	LANG	Drawing No.	P1-739-4E.LSS



Key :

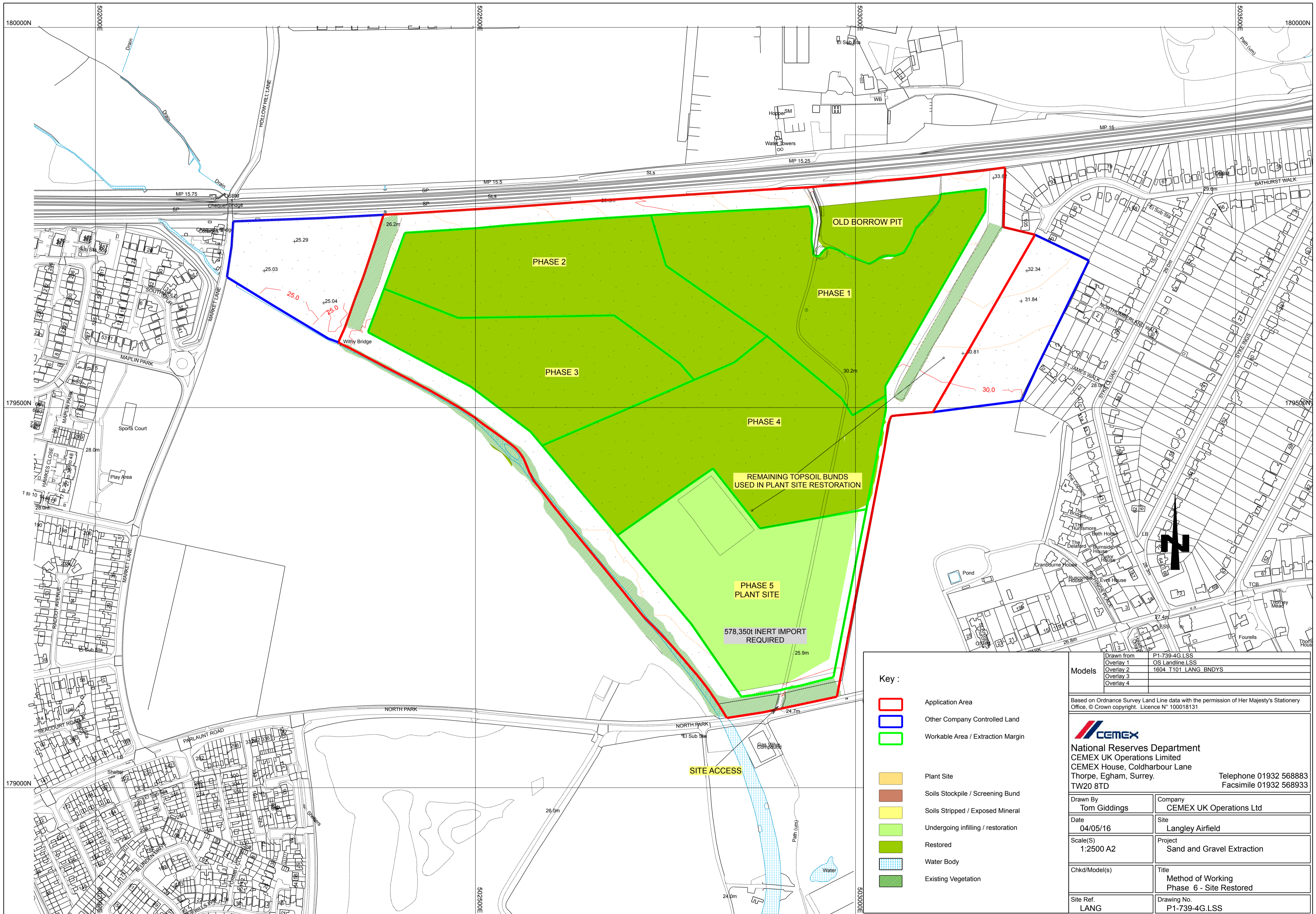
	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

Drawn from	P1-739-4FLSS
Overlay 1	OS Landline.LSS
Overlay 2	1604 T101 LANG BNDYS
Overlay 3	
Overlay 4	

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Drawn By	Tom Giddings	Company	CEMEX UK Operations Ltd
Date	04/05/16	Site	Langley Airfield
Scale(S)	1:2500 A2	Project	Sand and Gravel Extraction
Chkd/Model(s)		Title	Method of Working Phase 5 - Plant Site Mineral Extraction
Site Ref.	LANG	Drawing No.	P1-739-4FLSS




Key :

	Application Area
	Other Company Controlled Land
	Workable Area / Extraction Margin
	Plant Site
	Soils Stockpile / Screening Bund
	Soils Stripped / Exposed Mineral
	Undergoing infilling / restoration
	Restored
	Water Body
	Existing Vegetation

Drawn from	P1-739-4G.LSS
Overlay 1	OS Landline.LSS
Overlay 2	1604 T101 LANG BNDYS
Overlay 3	
Overlay 4	

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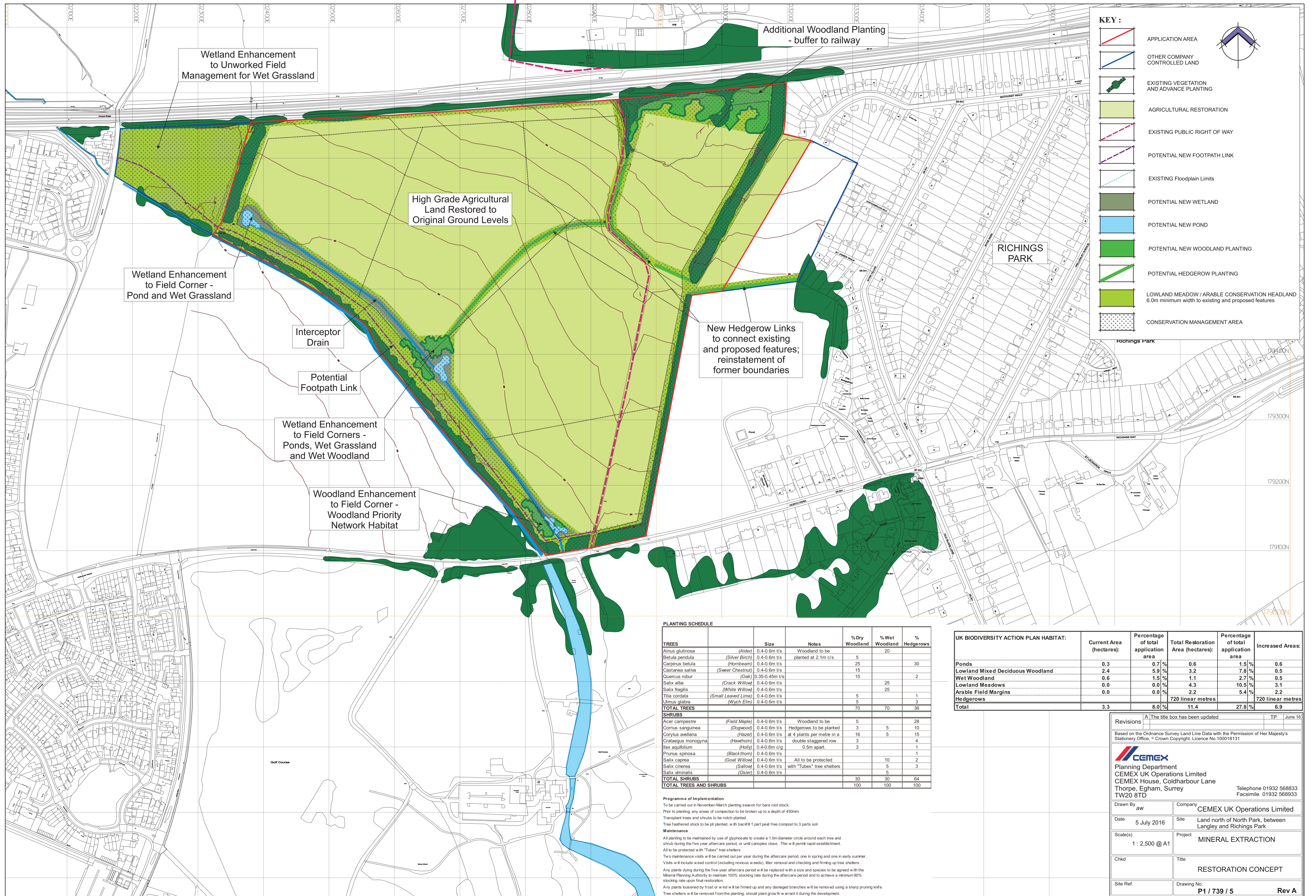


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Drawn By Tom Giddings	Company CEMEX UK Operations Ltd
Date 04/05/16	Site Langley Airfield
Scale(S) 1:2500 A2	Project Sand and Gravel Extraction
Chkd/Model(s)	Title Method of Working Phase 6 - Site Restored
Site Ref. LANG	Drawing No. P1-739-4G.LSS

APPENDIX D

Restoration Plan



KEY :

- APPLICATION AREA
- OTHER COMPANY CONTROLLED LAND
- EXISTING VEGETATION AND ADVANCE PLANTING
- AGRICULTURAL RESTORATION
- EXISTING PUBLIC RIGHT OF WAY
- POTENTIAL NEW FOOTPATH LINK
- EXISTING Floodplain Limits
- POTENTIAL NEW WETLAND
- POTENTIAL NEW POND
- POTENTIAL NEW WOODLAND PLANTING
- POTENTIAL HEDGEROW PLANTING
- LOWLAND MEADOW / ARABLE CONSERVATION HEADLAND 6.0m minimum width to existing and proposed features
- CONSERVATION MANAGEMENT AREA

PLANTING SCHEDULE

TREES	Size	Notes	% Dry Woodland	% Wet Woodland	% Hedgerows
<i>Alnus glutinosa</i> (Alder)	0.4-0.6m t/s	Woodland to be planted at 2.1m c/s	5	20	
<i>Betula pendula</i> (Silver Birch)	0.4-0.6m t/s		25		30
<i>Carpinus betula</i> (Hornbeam)	0.4-0.6m t/s		15		
<i>Castanea sativa</i> (Sweet Chestnut)	0.4-0.6m t/s		15		2
<i>Quercus robur</i> (Oak)	0.35-0.45m t/s			25	
<i>Salix alba</i> (Crack Willow)	0.4-0.6m t/s			25	
<i>Salix fragilis</i> (White Willow)	0.4-0.6m t/s			25	
<i>Tilia cordata</i> (Small Leaved Lime)	0.4-0.6m t/s		5		3
<i>Ulmus glabra</i> (Wych Elm)	0.4-0.6m t/s		5		3
TOTAL TREES			70	70	36
SHRUBS					
<i>Acer campestre</i> (Field Maple)	0.4-0.6m t/s	Woodland to be	5		28
<i>Cornus sanguinea</i> (Dogwood)	0.4-0.6m t/s	Hedgerows to be planted at 4 plants per metre in a	3	5	10
<i>Corylus avellana</i> (Hazel)	0.4-0.6m t/s		16	5	15
<i>Crataegus monogyna</i> (Hawthorn)	0.4-0.6m t/s	double staggered row 0.5m apart.	3		4
<i>Ilex aquifolium</i> (Holly)	0.4-0.6m t/s		3		1
<i>Prunus spinosa</i> (Blackthorn)	0.4-0.6m t/s				1
<i>Salix caprea</i> (Goat Willow)	0.4-0.6m t/s	All to be protected with "Tubex" tree shelters		10	2
<i>Salix cinerea</i> (Sallow)	0.4-0.6m t/s			5	3
<i>Salix viminalis</i> (Osier)	0.4-0.6m t/s			5	
TOTAL SHRUBS			30	30	64
TOTAL TREES AND SHRUBS			100	100	100

Programme of Implementation

To be carried out in November-March planting season for bare root stock.

Prior to planting, any areas of compaction to be broken up to a depth of 450mm.

Transplant trees and shrubs to be notch planted.

Tree feathered stock to be pit planted, with backfill 1 part peat free compost to 3 parts soil.

Maintenance

All planting to be maintained by use of glyphosate to create a 1.0m diameter circle around each tree and shrub during the five year aftercare period, or until canopies close. This will permit rapid establishment.

All to be protected with "Tubex" tree shelters.

Two maintenance visits will be carried out per year during the aftercare period, one in spring and one in early summer.

Visits will include weed control (including noxious weeds), litter removal and checking and firming up tree shelters.

Any plants dying during the five-year aftercare period will be replaced with a size and species to be agreed with the Mineral Planning Authority to maintain 100% stocking rate during the aftercare period and to achieve a minimum 90% stocking rate upon final restoration.

Any plants loosened by frost or wind will be firmed up and any damaged branches will be removed using a sharp pruning knife.

Tree shelters will be removed from the planting, should plant growth warrant it during the development.

UK BIODIVERSITY ACTION PLAN HABITAT:

	Current Area (hectares):	Percentage of total application area	Total Restoration Area (hectares):	Percentage of total application area	Increased Areas:
Ponds	0.3	0.7%	0.6	1.5%	0.6
Lowland Mixed Deciduous Woodland	2.4	5.9%	3.2	7.8%	0.5
Wet Woodland	0.6	1.5%	1.1	2.7%	0.5
Lowland Meadows	0.0	0.0%	4.3	10.5%	3.1
Arable Field Margins	0.0	0.0%	2.2	5.4%	2.2
Hedgerows			720 linear metres		720 linear metres
Total	3.3	8.0%	11.4	27.8%	6.9

Revisions: A The title box has been updated. TP June 16

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Drawn By: aw	Company: CEMEX UK Operations Limited
Date: 5 July 2016	Site: Land north of North Park, between Langley and Richings Park
Scale(s): 1 : 2,500 @ A1	Project: MINERAL EXTRACTION
Chkd:	Title: RESTORATION CONCEPT
Site Ref:	Drawing No. P1 / 739 / 5
	Rev A

Langley Quarry Inert Recovery Site

Environmental Permit Application

Environmental Risk Assessment

CEMEX UK Materials Limited

June 2021

Prepared on Behalf of Tetra Tech Environment Planning Transport Limited.
Registered in England number: 03050297

Document Control

Document:	Environmental Risk Assessment
Project:	Langley Quarry Inert Recovery Site
Client:	CEMEX UK Materials Limited
Job Number:	A113749
File Origin:	\\southampton14\Data\Projects\Cemex UK Operations (C05081)\A113749 (Langley Waste Recovery)\Reports\

Revision:	-	Status:	Final – Submission to the Environment Agency		
Date:	June 2021				
Prepared by:	Chris Muir	Checked by:	Alice Shaw	Approved by:	Andrew Bowker
Description of revision:					

Revision:		Status:			
Date:					
Prepared by:		Checked by:		Approved By:	
Description of revision:					

Revision:		Status:			
Date:					
Prepared by:		Checked by:		Approved By:	
Description of revision:					

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2.0	ENVIRONMENTAL RISK ASSESSMENT	2

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Table 2: Location of potential receptors in relation to the proposed activity	4

DRAWINGS

CEM/A103725/REC/01 - Receptor Plan

P1/739/4B – Method of Working and Restoration Phases

APPENDICES

Appendix A – Environmental Risk Assessment

Appendix B – Nature and Heritage Conservation Screen Results

Appendix C – Flood Risk Assessment

1.0 INTRODUCTION

1.1 REPORT SCOPE

- 1.1.1 This section of the Environmental Permit application corresponds to Section 6 of Part B2 of the Environmental Permit application form, and has been prepared on behalf of the Operator, CEMEX UK Materials Limited (CEMEX), by Tetra Tech.
- 1.1.2 The operator seeks to gain a bespoke inert recovery permit for the permanent deposit of waste to land at Langley Quarry to facilitate the restoration scheme as approved under planning permission reference CM/51/16.
- 1.1.3 This Environmental Risk Assessment (ERA) is limited to a qualitative assessment of the potential risks to the environment and human health specifically related to the proposed activity. This report will identify any significant risk and demonstrate that the risk of pollution will be acceptable by taking the appropriate measures to manage the risk.

2.0 ENVIRONMENTAL RISK ASSESSMENT

2.1 METHODOLOGY

2.1.1 This report has been prepared following Environment Agency guidance Risk Assessment guidance. It specifically relates to the potential risks associated with the following risk types:-

- Odour;
- Noise and vibration;
- Fugitive emissions; and
- Accidents and incidents.

2.1.2 This risk assessment addresses the above, and is based on the following methodology:-

- Identification of potential sources of risk;
- Identification of all potential receptors to risk; and
- Risk assessment of each risk type.

2.1.3 The ERA is a tool used to identify the pollutant linkage i.e., source – pathway – receptor. For most risks, the atmosphere is the main pathway and will always exist. Therefore, the ERA deals primarily with the sources and receptors. The ERA is provided in Appendix A and is summarised below.

2.1.4 A Nature and Heritage Conservation Screen (Reference Number EPR/HB3602MC/A001) was requested from the Environment Agency. This screen determines the presence of any sites of nature and heritage conservation, or protected species or habitats that may be impacted by the proposal.

2.1.5 The results of the screen (Appendix B) identified one area of deciduous woodland located to the south east of the site which has been designated as a Protected Habitat.

2.2 SOURCES

2.2.1 The potential sources of risks have been considered for each risk type, as shown in Appendix A. The sources of risk for this application have been identified as:-

Odour

- Waste materials.

Noise

- Plant and machinery.
- Vehicle movements to/from the site.
- Vehicle movements within the site.
- Engineering works.

Fugitive emissions

- Particulate matter (dust).
- Mud and litter.
- Scavenging birds, pests and vermin.

Accidents

- Leaks/spillages.
- Fire or failure to contain firewater.
- Flooding.
- Vandalism.

2.3 PATHWAYS

2.3.1 The pathways have been identified for each risk type as shown below in Table 1:

Table 1: Potential Pathways

Risk Type	Pathway
Odour	Atmosphere
Noise	Atmosphere
Fugitive emissions	Atmosphere
	Atmosphere
	Surface water run-off

Accidents	Infiltration
	Percolation

2.4 RECEPTORS

2.4.1 Receptors within 1km of the proposed application boundary, including those identified in the Nature and Heritage Conservation Screen (Appendix B), have been listed in Table 2 and are shown on Drawing Number CEM/A103725/REC/01. The main pathway for the identified sources will be the atmosphere and as such, atmospheric conditions can affect dispersion rates and hence potential risk. As a result, the location of each receptor in relation to the site may influence the potential impact of the risk, as summarised in Table 2.

Table 2: Location of potential receptors in relation to the proposed activity

Receptor	Direction from Operational Area	Minimum Distance from Proposed Waste Treatment Boundary (approx. m)
Designated ecological habitats/sites of geological importance e.g. Ramsar, SAC, SPA, SSSI, LNR, NNR, LWS		
Opposite Iver Station (LWS)	NE	50
Grand Union Canal, Slough (LWS)	NE	70
Domestic Dwellings/ Farmhouses		
Richings Park Housing Estate	E/SE	Adjacent/Surrounding
Langley Town	W/SW	217
Old Slade Farm	SE	773
St Leonards Chapel	S	260
St Andrews URS Church	E	238
Parsonage Farm	NW	905
Commercial and Industrial Premises		
Axis Park Industrial buildings	SW	847
Industrial Buildings Between Canal and Rail line	NE	41
Caravan Park on Hollow Hill Lane	N	267
High Line Yachting	N	377
Langley Business Centre	W	722
Iver Golf Club and Academy	NW	606
Richings Park Golf Club	S	50
Industrial Buildings on Station Road	NW	487
The Ridgeway Trading Estate	NE	568
Schools / Hospitals / Shops		
Parluent Park Primary Academy	W	444
Railways		
Railway Line	N	Adjacent
Highways or Minor Roads		
North Park	S	Adjacent
Market Lane	W	177
Hollow Hill Lane	NW	193
M25 Motorway	E	900

M4 Motorway	S	908
Grade II Listed Buildings;		
Moat house of Parsonage Farm	NW	988
Farmhouse of Parsonage Farm	NW	999
Thorney House on Richings Way	E	675
Building to the West of Sutton Court Farm	SW	852
Building on Little Sutton Lane	SW	901
Priority Habitats (closest Deciduous Woodland in each direction)		
Deciduous Woodland	NE	250
Deciduous Woodland	NW	370
Deciduous Woodland	SW	Adjacent
Deciduous Woodland	SE	643
Deciduous Woodland	S	241
Traditional Orchids	SE	241
Traditional Orchids	SE	836
Sensitive land uses e.g. farmland, allotments, commercial fish farms		
Agricultural Land	W and E	Adjacent and Surrounding
Surface Water e.g. rivers and streams		
Pond in disused pit (to be infilled)	On Site	On Site
Grand Union Canal	N	270
Horton Brook	W	Adjacent to site
Golf Course Ponds	S	214
Drainage Network	SW	636
Groundwater (sensitivity)		
According to the Environment Agency, the site is not located within a Groundwater Source Protection Zone, nor within an area which has a designated aquifer.		

2.5 RISK ASSESSMENT

2.5.1 The ERA (Appendix A) looks at each specific hazard identified and assesses the likelihood of those hazards impacting on the receptors. This is achieved by fulfilling the following objectives:-

- Identify the location and nature of each hazard;
- Identify the specific receptors potentially at risk and assess the sensitivity of each receptor;
- Provide a qualitative assessment of the risk posed to each sensitive receptor;
- Identify management and monitoring techniques; and
- Provide recommendations for more detailed assessments where necessary.

2.6 SUMMARY OF ERA

2.6.1 The Environmental Risk Assessment (Appendix A) indicates that the proposed inert recovery site will have no significant impacts in terms of odour, noise and vibration, and fugitive emissions, and the likelihood of accidents is minimal.

DRAWINGS

CEM/A103725/REC/01 - Receptor Plan

P1/739/4B – Method of Working and Restoration Phases

APPENDIX A – ENVIRONMENTAL RISK ASSESSMENT

Table A1 – Odour Risk Assessment and Management Plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	Receptor	Pathway	Risk Management	Probability of Exposure	Consequence	What is the overall risk?
What has the potential to cause harm?	What is at risk? What do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? If it occurs – who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence.
Receipt and storage of waste	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Staff and pupils of nearby academy.</p> <p>Users of nearby roads/canal.</p> <p>Priority Habitats listed in Table 2.</p>	Atmosphere	<p>The proposed waste types are not putrescible and therefore will not biodegrade to produce offensive odours.</p> <p>There will be strict waste acceptance procedures in place to minimise the risk of non-compliant wastes being accepted. Details of these procedures are provided in the Operating Techniques (Appendix C of the Environmental Permit Application).</p> <p>All site operatives will be vigilant with regard to identifying non-compliant wastes and any non-conformances or odour issues will be reported to the Site Manager.</p>	Unlikely due to the nature of the proposed waste types and the measures in place.	Odour annoyance	Not significant due to management techniques employed.

Table A2 – Noise and Vibration Risk Assessment and Management Plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	Receptor	Pathway	Risk Management	Probability of Exposure	Consequence	What is the overall risk?
What has the potential to cause harm?	What is at risk? What do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? If it occurs – who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence.
Vehicle movements on site.	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Staff and pupils of nearby Academy</p> <p>Users of nearby roads/ union canal.</p> <p>Priority Habitats listed in Table 2.</p>	Atmosphere	<p>Loads will only be delivered to the site during the hours stipulated (07:00 – 18:00 Monday – Friday and 07:00-13:00 on Saturdays) in the planning permission.</p> <p>The delivery of waste will take place in a controlled manner to keep noise/vibration to a minimum.</p> <p>Two screening bunds; one measuring 5m high and one 3m high, will be constructed along the eastern boundary of the application site using topsoil and overburden soils. This will minimise the potential for noise to impact upon the residential area that is located to the east of the site (as detailed in Table 2).</p> <p>All plant and machinery will have effective silencers where practicable and be maintained in accordance with the manufacturer's requirements to minimise the generation of noise.</p> <p>All equipment and vehicles when not in regular use shall be switched off.</p> <p>All noise and vibration generating activity will be monitored closely and site operatives will be vigilant and report any excessive noise or vibration issues to the Site Manager.</p> <p>In addition to the above, a Noise Impact Assessment (NIA) has been prepared which provides an assessment of noise from the proposed activities including vehicle movements. The NIA is provided as Appendix K of the Environmental Permit Application.</p>	Intermittent during operating hours.	Intermittent noise and vibration disturbance.	Not significant due to management techniques employed.

Noise from reverse vehicle warnings	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Staff and pupils of nearby Academy</p> <p>Users of nearby roads/ union canal.</p> <p>Priority Habitats listed in Table 2.</p>	Atmosphere	<p>All noise generating activity will be undertaken within the hours stipulated (07:00 – 18:00 Monday – Friday and 07:00-13:00 on Saturdays) in the planning permission with the exception of emergency repairs.</p> <p>Utilisation of low level warning signals.</p> <p>Two screening bunds; one measuring 5m high and one 3m high, will be constructed along the eastern boundary of the application site using topsoil and overburden soils. This will minimise the potential for noise to impact upon the residential area that is located to the east of the site (as detailed in Table 2).</p> <p>All noise and vibration generating activity will be monitored closely and site operatives will be vigilant and report any excessive noise or vibration issues to the Site Manager.</p> <p>In addition to the above, a Noise Impact Assessment (NIA) has been prepared which provides an assessment of noise from the proposed activities including vehicle movements. The NIA is provided as Appendix K of the Environmental Permit Application.</p>	Intermittent during operating hours.	Intermittent noise and vibration disturbance.	Not significant due to management techniques employed.
Noise and vibration from loading and unloading of wastes.	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties</p>	Atmosphere	<p>Loads will only be delivered to the site during the hours stipulated (07:00 – 18:00 Monday – Friday and 07:00-13:00 on Saturdays) in the planning permission with the exception of emergency repairs.</p> <p>All plant and machinery will have effective silencers where practicable and be maintained in accordance with the manufacturer's requirements to minimise the generation of noise.</p>	Intermittent during operating hours.	Intermittent noise and vibration disturbance.	Not significant due to management techniques employed.

	<p>identified in Table 2.</p> <p>Staff and pupils of nearby nursery.</p> <p>Users of nearby roads / union canal.</p> <p>Priority Habitats listed in Table 2.</p>		<p>The loading/unloading of wastes will be undertaken in a controlled manner to keep noise/vibration to a minimum. Vehicles will be directed by site operatives to minimise the drop height when depositing loads at the site.</p> <p>Two screening bunds; one measuring 5m high and one 3m high, will be constructed along the eastern boundary of the application site using topsoil and overburden soils. This will minimise the potential for noise to impact upon the residential area that is located to the east of the site (as detailed in Table 2).</p> <p>All noise and vibration generating activity will be monitored closely and site operatives will be vigilant and report any excessive noise or vibration issues to the Site Manager.</p> <p>In addition to the above, a Noise Impact Assessment (NIA) has been prepared which provides an assessment of noise from the proposed activities including vehicle movements. The NIA is provided as Appendix K of the Environmental Permit Application.</p>			
Noise and vibrations from engineering works	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Staff and pupils of nearby nursery.</p>	Atmosphere	<p>Loads will only be delivered to the site during the hours stipulated (07:00 – 18:00 Monday – Friday and 07:00-13:00 on Saturdays) in the planning permission with the exception of emergency repairs.</p> <p>All plant and machinery will have effective silencers where practicable and be maintained in accordance with the manufacturer's requirements to minimise the generation of noise.</p> <p>All plant and equipment will be switched off when not in regular use.</p> <p>Two screening bunds; one measuring 5m high and one 3m high, will be constructed along the eastern boundary of the application site using topsoil and overburden soils. This will minimise the potential for noise to impact upon the residential area that is located to the east of the site (as detailed in Table 2).</p>	Intermittent during operating hours.	Intermittent noise and vibration disturbance.	Not significant due to management techniques employed.

	<p>Users of nearby roads / union canal.</p> <p>Priority Habitats listed in Table 2.</p>		<p>All noise and vibration generating activity will be monitored closely and site operatives will be vigilant and report any excessive noise or vibration issues to the Site Manager.</p> <p>In addition to the above, a Noise Impact Assessment (NIA) has been prepared which provides an assessment of noise from the proposed activities including vehicle movements. The NIA is provided as Appendix K of the Environmental Permit Application.</p>			
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Table A3 – Fugitive Emissions Risk Assessment and Management Plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	Receptor	Pathway	Risk Management	Probability of Exposure	Consequence	What is the overall risk?
What has the potential to cause harm?	What is at risk? What do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? If it occurs – who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence.
To Air						
Dust from haul roads.	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Staff and pupils of nearby nursery.</p> <p>Users of nearby roads / union canal.</p> <p>Surrounding agricultural land</p> <p>Priority Habitats listed in Table 2.</p>	Atmosphere	<p>Any waste vehicles or haul roads that gather significant amounts of dust will be dampened or washed as and when necessary. The site will also be subject to the use of a water bowser which will be implemented as necessary to suppress any dust left on the hardstanding due to vehicle movements.</p> <p>The site will benefit from the use of a wheel wash facility that is located next to the site gate and will be utilised for all outgoing vehicles.</p> <p>The wheel wash will be checked monthly and any necessary repair work will be carried out as soon as practicable. In the event of a breakdown, additional road cleaning equipment will be provided. If necessary, a road sweeper will be contracted to clean the site access road and North Park Highway where vehicles exit the site.</p> <p>Wastes being delivered will be covered or sheeted to prevent the emission of dust while the waste is in transit.</p>	<p>Dust could potentially reach the nearby dwellings when a strong wind blows in their direction.</p> <p>Management actions should prevent this happening.</p>	<p>Smothering.</p> <p>Nutrient enrichment.</p> <p>Nuisance – dust on cars, clothing, vegetation, etc.</p>	Not significant due to management techniques employed.

			<p>All vehicle drivers will comply with the speed limits within the site and on the access roads.</p> <p>The Site Manager will undertake a daily visual assessment of dust levels and all site operatives will be vigilant and report any problems to the Site Manager.</p> <p>Dust will be managed in accordance with the Dust Management Plan that's provided as Appendix J of the Environmental Permit Application.</p>			
Dust emissions generated during unloading of inert waste from HGVs	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Surrounding agricultural land</p> <p>Staff and pupils of nearby nursery.</p> <p>Users of nearby roads / union canal.</p>	Atmosphere	<p>A water bowser will be used to dampen site roads and stockpiles if deemed necessary.</p> <p>The loading/unloading of wastes will be undertaken in a controlled manner to keep dust emissions to a minimum. Extra care will be taken with the deposit of waste during periods of prolonged dry weather or high wind.</p> <p>The Site Manager will undertake a daily visual assessment of dust levels and all site operatives will be vigilant and report any problems to the Site Manager.</p> <p>Dust will be managed in accordance with the Dust Management Plan that's provided as Appendix J of the Environmental Permit Application.</p>	Dust could potentially reach the nearby dwellings when a strong wind blows in their direction. Management actions should prevent this happening.	<p>Smothering.</p> <p>Nutrient enrichment.</p> <p>Nuisance – dust on cars, clothing, vegetation, etc.</p>	Not significant due to management techniques employed.
To Water						
Contaminated rainwater run-off.	Groundwater & Surface water	Direct surface water run-off from site.	The proposed waste types are inert and therefore non-hazardous. As such, any run-off that is generated on site will simply	Unlikely due to the nature of the proposed wastes	Contamination of surface water	Not significant due to management techniques

	<p>Occupiers of domestic/commercial dwellings listed in Table 2.</p> <p>Surrounding agricultural land</p> <p>Staff and pupils of nearby academy</p>	<p>Infiltration.</p> <p>Percolation.</p>	<p>be rainwater which has passed through inert soils, and therefore is not likely to be contaminated. An attenuation layer will be constructed to prevent leaching of contaminants into the groundwater. A Hydrogeological Risk Assessment has been produced in support of the application.</p> <p>There will be strict waste acceptance procedures in place at the site to prevent the acceptance of non-conforming waste types. Details of the waste acceptance procedures are provided in the Operating Techniques (Appendix C of the Environmental Permit Application).</p>	<p>types and the measures in place.</p>	<p>bodies and groundwater.</p>	<p>employed and the inert nature of the waste types.</p>
Pests/Scavenging birds						
<p>Birds and Pests.</p>	<p>Occupiers of domestic dwellings listed in Table 2 above.</p> <p>Local Wildlife Sites identified in Table 2.</p> <p>Workforce in commercial and industrial properties identified in Table 2.</p> <p>Priority Habitats identified in Table 2.</p> <p>Staff and pupils of nearby academy</p>	<p>Air.</p> <p>Ground.</p>	<p>The proposed waste types are not putrescible and will therefore not be attractive to pests or scavenging birds.</p> <p>There will be strict waste acceptance procedures in place at the site to prevent the acceptance of non-conforming waste types. Details of the waste acceptance procedures are provided in the Operating Techniques (Appendix C of the Environmental Permit Application).</p> <p>The Site Manager will undertake regular reviews of pests and scavenging birds at the site. All site operatives will be vigilant and report any problems to the Site Manager.</p>	<p>Very unlikely.</p>	<p>Nuisance to local residents.</p> <p>Predation of species in Local Wildlife Sites and Priority Habitats.</p>	<p>Not significant due to management techniques employed and the inert nature of the waste types.</p>

	Surrounding agricultural land					
Mud/Litter						
Mud arising from vehicles movements	Highways identified in Table 2.	Tracked by vehicles.	<p>The site will comprise a vehicle wheel washing facility that will be used by HGVs before they leave the site.</p> <p>The amount of mud on local roads will be monitored daily by site operatives.</p> <p>In the event that mud is deposited on the access road and/or highway then a road sweeper will be employed if necessary.</p>	Unlikely due to measures in place.	Mud on roads is unsightly and can increase the risk of road traffic incidents.	Not significant due to management techniques employed.
Litter arising from vehicle movements and high winds.	All receptors identified in Table 2.	Air Tracked by vehicles	<p>Due to the nature of the proposed waste types, litter will not be generated at the site. The proposed waste types are not considered to represent a significant risk of litter.</p> <p>There will be strict waste acceptance procedures in place at the site to prevent the acceptance of non-conforming waste types. Details of the waste acceptance procedures are provided in the Operating Techniques (Appendix C of the Environmental Permit Application).</p> <p>A vigilant watch for litter will be undertaken by site operatives. In the unlikely event that litter is generated by the activity, the Site Supervisor will implement a litter collection as necessary.</p>	Very unlikely due to measures in place.	Local nuisance.	Not significant due to the inert nature of waste received and management techniques employed.

Table A4 – Accident Risk Assessment and Management Plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	Receptor	Pathway	Risk Management	Probability of Exposure	Consequence	What is the overall risk?
What has the potential to cause harm?	What is at risk? What do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? If it occurs – who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence.
Fire or failure to contain firewater.	<p>Groundwater.</p> <p>Surface water bodies identified in Table 2.</p> <p>Local Wildlife Sites identified in Table 2.</p> <p>Priority Habitats identified in Table 2.</p> <p>Occupiers of domestic dwellings listed in Table 2.</p> <p>Workforce in commercial and industrial properties adjacent to the site identified in Table 2.</p>	<p>Infiltration.</p> <p>Contaminated rainwater runoff.</p>	<p>The risk of fire is considered to be low as the proposed waste types are not flammable.</p> <p>There will be strict waste acceptance procedures in place at the site to prevent the acceptance of non-conforming waste types. Details of the waste acceptance procedures are provided in the Operating Techniques (Appendix C of the Environmental Permit Application).</p> <p>The phasing plan (Drawing Number P1/739/4B) has been designed to create a minimum 10m stand off from the high pressure fuel pipeline that runs parallel to the Horton Brook. This will ensure that there is no interference with the pipeline during operation and therefore reduces the risk of fire.</p> <p>The Operator will undertake routine maintenance of all equipment in accordance with the manufacturer's guidance.</p> <p>Site notices and training will be undertaken regarding fire hazards.</p> <p>The Site Manager will be responsible for actions undertaken in the event of a fire.</p>	Very unlikely due to the nature of the waste types and the measures in place.	<p>Contamination of local groundwater and/or surface water.</p> <p>Local nuisance from smoke.</p>	Not significant due to the inert nature of waste types and likelihood of a fire on site.

Leaks/spillages of fuel/oil.	Groundwater. Surface waters identified in Table 2.	Surface run-off. Infiltration. Percolation	<p>The operator will undertake regular maintenance of plant equipment in accordance with manufacturer's guidance.</p> <p>All fuel, oil and lubricants will be contained within appropriate 110% bunded tanks. The tanks will be maintained and inspected in accordance with the manufacturer's recommendations.</p> <p>Daily vehicle / plant checks to ensure any fuel/oil leaks etc. are repaired as soon as possible.</p> <p>The phasing plan (Drawing Number P1/739/4B) has been designed to create a minimum 10m stand off from the high pressure fuel pipeline that runs parallel to the Horton Brook. This will ensure that there is no interference with the pipeline during operation and therefore reduces the risk of leaks and spillages.</p> <p>The Site Manager will be responsible for ensuring effective remediation and documenting any incident.</p>	Unlikely due to measures in place.	Contamination of land and watercourses.	Not significant due to management techniques employed.
Flooding.	Groundwater. Surface water bodies identified in Table 2.	Infiltration. Contaminated surface water runoff.	<p>A Flood Risk and Drainage Assessment was prepared for the site by ESI (now STANTEC) in 2015. The assessment has been appended to this document as Appendix C.</p> <p>The assessment states 'flood mitigation measures and drainage strategy described in the report will be sufficient to mitigate any onsite and offsite flood risk during operation and after restoration of the Site.' A drainage strategy is proposed to intercept surface water runoff using a small ditch between the Horton Brook and the restored agricultural area, and also to provide storage within ponds and wetlands on the site.</p>	Unlikely due to measures in place and the inert nature of the waste types.	<p>Disruption to works on site.</p> <p>Contamination of local groundwater and/or surface water.</p> <p>Contamination of local agricultural land.</p>	Not significant due to the inert nature of the proposed waste types and management techniques employed.

			It is anticipated that the majority of surface runoff will infiltrate back to ground. However, excess flow from large rainfall events can be stored in the ditches and ponds before being released to Horton Brook.			
Vandalism.	<p>Groundwater.</p> <p>Surface water bodies identified in Table 2.</p> <p>Local Wildlife Sites identified in Table 2.</p> <p>Priority Habitats identified in Table 2.</p> <p>Occupiers of domestic dwellings listed in Table 2.</p> <p>Workforce in commercial and industrial properties adjacent to the site identified in Table 2.</p>	Unauthorised entry to the site.	<p>The site is gated and is surrounded by security fencing and vegetation.</p> <p>Any identified damage to the gate and the perimeter fence that could compromise the site security will be recorded and temporarily repaired as necessary before the end of the working day. Permanent repair or replacement will be undertaken as soon as practicable.</p> <p>Procedures are in place which require all visitors to the site to sign in on arrival and sign out on departure.</p>	Unlikely due to measures in place.	Release of polluting materials to air (smokes or fumes) water or land.	Not significant due to management techniques employed.

APPENDIX B – NATURE AND HERITAGE CONSERVATION SCREEN RESULTS

APPENDIX C – FLOOD RISK ASSESSMENT