PUMPING PURLEY ELECTRIC PUMPS  DATE 5-1-2012.

CYCLE TIME PUMPING EVERY 4 HOURS,

TAKING APPRX 1 HOUR FROM STARTING

PUMPING TO STOP PUMPING.

IN WHICH TIME APPRX 50,000 LITRES

WILL BE PUMPED TO OOLDBURY QUARRY

THIS HAPPENS SIX TIME IN 24 HOURS

GIVING AN APPRX TOTAL ACCORDING TO

WEATHER CONDITIONS OF 300,000 LITRES.

26' x 29'

SIZE OF POND 7.97 x 8.83 METRES.
PUMPING STARTS AT 1.50m AND 1.75 ALTERNATELY AND OFF AT 0.95m BOTH TIMES.

OUR READINGS OF PUMPS ON 5-1-2012

NO1 PUMP, 0342709.

NO2 PUMP, 11029.98.

ONLY ONE PUMP OPERATING AT A GIVEN TIME.
Lafarge Tarmac Trading Limited

MANCETTER QUARRY
Atherstone, Warwickshire

Proposal to Extend Existing Quarry Workings

Hydrogeological and Hydrological Assessment

June 2014

APPENDIX X

Estimating Groundwater Ingress & Radius of Influence
Appendix 10

A.10.1 Calculating Radius of Influence of dewatering drawdown

An initial estimate of the radius of influence of dewatering drawdown at the Quarry has been calculated using a simplified analytical approach detailed in CIRIA (Construction Industry Research and Information Association) Report No 113, ‘Control of groundwater for temporary works’ (SH Somerville, 1986), which gives the following equation for estimating radius of influence ($R_o$) for given drawdown ($h$) and hydraulic conductivity ($k$):

$$R_o = \frac{3000 \ h}{k}$$

(assuming radial flow)

- $R_o$ = Radius of influence (m)
- $h$ = Drawdown (m)
- $k$ = Hydraulic conductivity (m/sec)

A.10.2 Calculating Groundwater Ingress Rates

An initial estimation of the groundwater ingress rate at the Quarry has been calculated using the Todd equation (“Groundwater Hydrology”, D K Todd, 1980):

$$Q = B \ k \ (S_x^2 - S_y^2) \ \log_e (R/r)$$

- $Q$ = Ingress rate (m$^3$/day)
- $B$ = 3.142
- $k$ = Hydraulic conductivity (m/day)
- $S_x$ = Aquifer thickness (m) before drawdown
- $S_y$ = Remaining aquifer thickness (m) during drawdown
- $R$ = Radius of quarry “r” + Radius of influence “$R_o$” (m)
- $r$ = Radius of quarry (m)

- Site observation at quarries excavating similar rock type indicates that the quarry floor is likely to become blinded by fines material, washed down into the lowest sinking by rainfall run-off. It appears that groundwater ingress is principally directed through the sidewalls, rather than floor.

- Accordingly, the Todd equation is re-run using the following values: $S_x$ = 85 m (the estimated level of dewatering drawdown required in the final development), $S_y$ = zero (the base of the “active” aquifer coincides with the quarry floor: this is because inflow is via the sidewalls rather than quarry floor). On this basis, $S_y$ is removed from the equation.
Oldbury, Final Development to 50 maOD, Full Dewatering

**Radius of Influence**
CIRIA $R_o = C \times S \times \sqrt{k}$

**Discharge**
Modified Todd - Impermeable base

**Distance Drawdown**
CIRIA "Percentage" method

**Input Variables**
Red text

**Representing extraction area by well**

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<td>width of void</td>
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<td>$C$</td>
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<tr>
<th>$K$ (m/s)</th>
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<th>$R_o$</th>
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**Distance Drawdown**

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<tr>
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<td>25.76</td>
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<td>0.52</td>
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Lowest base of working is 50 maOD. Pre-quarrying groundwater level is at 135 maOD.
Lafarge Tarmac Trading Limited
MANCETTER QUARRY
Atherstone, Warwickshire

Proposal to Extend Existing Quarry Workings

Hydrogeological and Hydrological Assessment

June 2014

APPENDIX XI
Flood Risk Assessment
# TECHNICAL NOTE

## Flood Risk Assessment

### Proposal to Extend Existing Quarry Workings:

**Mancetter Quarry, Atherstone, Warwickshire**

June 2014

BCL/htl/MCT/009.doc/14

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<td>Controlling Runoff to Third-Party Land / Receiving Watercourse from Oldbury</td>
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1 BACKGROUND

1.1 BCL Consultant Hydrogeologists Limited has been instructed by Lafarge Tarmac Trading Limited to carry out a Flood Risk Assessment (FRA) to support a Planning Application seeking consent to extend the existing workings at Mancetter Quarry, Atherstone (the Site). The landholding is centred upon National Grid Reference (NGR) 30800(E) 95600(N).

1.2 Mineral extraction at Mancetter Quarry has historically been concentrated in three separate void spaces: the (currently active) Oldbury workings to the south, the (fully restored) Jubilee workings at the centre of the landholding and the (largely restored) Purley workings to the north. The Plant Site lies within a narrow valley to the east of the Jubilee workings.

1.3 The Proposed Development, which involves deepening and extending the Oldbury workings in a westerly direction, is hereafter referred to as the Western Extension.

1.4 Current land use within the proposed extension area includes: farmland, scrub and a small part of the Purley Chase Golf Course.

1.5 The final development will occupy an area of approximately 106.4 hectares (Ha), with 76.5 Ha constituting the existing development (Oldbury, Purley, Jubilee and Plant Site) and approximately 29.9 Ha constituting the proposed Western Extension.

1.6 It should be noted that not all of the area covered by the proposed extension would be subject to mineral extraction operations, instead a significant area (17 Ha) will be utilised to create a permanent screening landform (“the Western Landform”). This Western Landform will accommodate in the region of 1.5 million m³ of overburden and shale. The full extent of the Application Area is illustrated upon figure 5 within appendix 1 of the accompanying Hydrogeological and Hydrological Assessment (HRA).

1.7 The FRA has been prepared to accompany the planning application seeking consent for the Proposed Development.

1.8 This document details the findings of the FRA.
2 INFORMATION CONSULTED IN THE PREPARATION OF THIS FRA

2.1 Policy and data sources consulted in the course of this assessment have included:

i) “National Planning Policy Framework” (NPPF: Department for Communities and Local Government [DCLG], March 2012).


iv) EA Modelled Flood Plain Map: 1:100 year (fluvial), 1:200 year (tidal flood) & 1:1,000 year (extreme flood).

v) Rainfall data: Meteorological Office and Flood Estimation Handbook (FEH), with accompanying CD-ROM.

vi) Published mapping data obtained from the Ordnance Survey (1:25,000 scale) and British Geological Survey (1:50,000 scale).

vii) Detailed topographic survey data and development plans, provided by the Applicant (Lafarge Tarmac Trading Limited).
3 TERMS OF REFERENCE / METHODOLOGY

3.1 The assessment has been conducted in accordance with guidance given in Diagram 1 of “Planning Practice Guidance for Flood Risk and Coastal Change”. In this instance, the assessment has therefore involved:

i. An appraisal of the availability and adequacy of existing information.

ii. Quantitative appraisal of the potential flood risk to the development.

iii. Quantitative appraisal of the potential impact of the Development Site on flood risk elsewhere.

iv. Qualitative demonstration of the effectiveness of any proposed mitigation measures.
4 SITE DESCRIPTION

4.1 Topographic survey

4.1.1 The Site is located on the upper northeast-facing slopes of the Anker Valley. The valley is aligned in a southeast to northwest direction and is approximately 7 km in width. Its floor has a basal elevation of approximately 70-75 metres above Ordnance Datum (maOD). Please refer to figure 5 in the accompanying HRA.

4.1.2 The northern (Purley) quarry is largely restored, forming a long narrow depression, the floor of which gently declines from south (115 maOD) to north (110 maOD). The surrounding ground generally ranges from 130 to 145 maOD but is bisected by a natural valley feature (occupied by the Rawn Hill Brook), which descends from southwest to northeast. As it crosses the Site, the valley floor drops from 115 maOD (western boundary) to 110 maOD (eastern boundary), coinciding with the lowest point at the northern end of the restored quarry. From here, the valley drops away to join the main Anker Valley (70-75 maOD), the confluence being some 2 km to the northeast.

4.1.3 The Plant Site occupies a narrow (un-named) valley feature lying to the east of the fully restored Jubilee Workings. The stockpiles occupy the steepest ground at the head of the valley (i.e. the southwest side of the Plant Site); the processing (crushing and screening) plant, two asphalt plants, offices and weighbridge are situated lower in the valley (the Site entrance being at the lowest point: 105 maOD). From here, the valley narrows and drops away towards the northeast i.e. the route of the Oldbury Stream.

4.1.4 The screening and processing of Recycled Asphalt Product (RAP) is conducted under an exemption from the Environmental Permitting (England & Wales) Regulations 2010, exemption ref: EPR/XE5902LW/A001. The screening area is located to the west of the Plant Site stockpiles; the processing area is situated close to the southwest corner of the Purley workings.
4.1.5 Extraction operations are now focused upon the southern (Oldbury) quarry, which comprises a deep cutting, aligned north-south. With a floor elevation of *circa* 70 maOD, these workings are lower than the surrounding ground in all directions: the screening bund upon the northeast boundary of the void space is at 155-165 maOD; the southwest boundary is at 145-150 maOD (beyond which the hillside continues to rise up to *circa* 171-172 maOD); and the hillfort (Oldbury Camp) adjacent the southernmost tip attains 178 maOD.

4.1.6 The proposed extension area (Western Extension) lies on the southwest side of the Oldbury void. It comprises a steep hillside with ground elevation rising from northeast to southwest. At 375-500 m standoff from the existing void, the slope reaches its maximum elevation of around 171-172 maOD and flattens out on to Purley Chase Golf Club and adjacent farmland.

4.2 Geological Setting

4.2.1 The quarry excavations extend along the outcrop of a series of diorite (lamprophyre) sills of Ordovician age. These igneous intrusions occur within the Outwoods Shale Formation, part of the Stockingford Shale Group. Please refer to figure 4 in the accompanying HRA.

4.2.2 The Western Extension is located close to the southwest limit of the Stockingford Shale Group outcrop. The Outwoods Shale Formation is overlain by younger formations of the same Group, namely the Moor Wood Sandstone and the Monks Park Shale.

4.2.3 The Nuneaton Ridge (upon which the quarry is located) is partially covered by Glacial Till.

4.3 Hydrological Setting

4.3.1 The Site falls within the catchment area of the River Anker. The river passes *circa* 1.5 km to the northeast of the Site entrance (2 km northeast of the Oldbury workings), flowing from southeast to northwest. Please refer to figure 5 in the accompanying HRA.

4.3.2 The Coventry Canal, which connects Tamworth and Coventry, runs roughly parallel to the River Anker, following the foot of the Nuneaton Ridge (upon which the quarry is located). At its closest approach, the canal passes approximately 0.5 km to the northeast of the Site entrance.
4.3.3 Several small watercourses (including Oldbury Stream and Rawn Hill Brook) drain the northeast-facing slopes of the Nuneaton Ridge (upon which the quarry is located). Flowing from southwest to northeast, they are directed via culvert under the Coventry Canal and continue onwards to join the River Anker.

4.3.4 Oldbury Stream receives all ingress waters pumped (via treatment lagoons) from the Purley and Oldbury workings. It also takes rainfall runoff from the Plant Site, which is passed through a series of weir tanks prior to discharge. Downstream from here, the stream drains east northeast to its confluence with the River Anker.

4.3.5 The Rawn Hill Brook rises approximately 1 km to the southwest of Purley Quarry. Flowing northeast, its course is intercepted by the Purley workings. The brook is received by a pond as it enters the Site and is then passed under the restored workings via buried pipes. At the eastern margin of the quarry, the pipes discharge into a weir box and the brook regains its natural course, flowing northeast towards the River Anker.

4.3.6 The Application Area lies within Flood Zone 1 i.e. outside the floodplain.

4.3.7 The risk of fluvial flooding is confined to (i) the narrow strip of land immediately adjacent the River Anker and (ii) the confluence of the Rawn Hill Brook with the main river.

4.3.8 There is some 30 m height difference between the closest stretch of floodplain (75 maOD) and the settlement facilities at the Site entrance (105 maOD).

4.4 Site Drainage – Oldbury Void

4.4.1 All ingress waters (i.e. rainfall runoff as well as groundwater input) drain under gravity into the quarry sump (70 maOD). This allows for preliminary settlement of any suspended solids entrained in the rainfall runoff from the incoming stretch of haul road as well as from the benches and overburden tips.

4.4.2 During a storm event, the sump accommodates rainfall run-off from the active quarry workings (as well as runoff from the solid tips at the southern end of the landholding and any future drainage from the overburden storage area in the Western Extension).

4.4.3 The water is removed from the quarry void using a 6-inch pump.
4.4.4 Site management advise that water is abstracted at a rate of between 650 m$^3$/d and 2,600 m$^3$/d, depending upon the operating schedule and rainfall conditions. The water level in the sump is maintained at a fixed depth (+/- 1 m).

4.4.5 A flow meter was installed on the discharge pipe on 17$^{th}$ April 2011, set at zero. Readings are taken on a monthly basis.

4.4.6 The readings that have been collected since installation are consistent with the estimated data given in section 4.4.4.

4.4.7 Averaged over the entire period (17$^{th}$ April 2011 to present), the daily rate of pumping (as derived from the flow meter readings) equates to 950-1,000 m$^3$/d.

4.4.8 The maximum pumping rate (1,960 m$^3$/d) occurred during the winter period 20$^{th}$ December 2013 to 31$^{st}$ March 2014, when there was a prolonged spell of unusually heavy rainfall.

4.4.9 The water from the quarry void is pumped to the 2-stage treatment lagoons situated upon higher ground (130 maOD) at the northern end of the Oldbury void. These lagoons have a combined surface area of circa 4,000 m$^2$. Their location is illustrated upon figure 8 in the accompanying HRA.

4.4.10 Having passed through the lagoons, the water is piped to the consented discharge point (“Outlet B”, NGR 431230 295950, as per Consent T/19/35436/T) and released into Oldbury Stream.

4.4.11 The maximum permitted rate of discharge is 5,237 m$^3$/day.

4.5 Site Drainage – Purley Void

4.5.1 The water level in the restored landform at Purley will need to be fixed at circa 115 maOD, which is some 5 m below the (extrapolated) pre-development groundwater level i.e. 5 m drawdown will be required in perpetuity.

4.5.2 Currently, this is achieved by pumping the water from the Purley sump over to the Oldbury drainage system, the estimated rate of pumping being 300 m$^3$/day. This process has been ongoing for many years; therefore it is already factored into the ingress data for the Oldbury void (section 4.4).
4.5.3 The preferred long-term option is to collect the water in a detention basin (for flow balancing as per calculations in section 6.1). This basin will be situated upon the floor of the Purley void. Depending upon water quality, the detention basin will drain under gravity to the (currently disused) discharge point at the northern end of the Purley void, thus allowing controlled overflow to the Rawn Hill Brook.

4.5.4 The proposed discharge rate of 300 m$^3$/day complies with the volumetric constraints of the existing (but disused) Discharge Consent T/19/07655/T, which permits the Applicant to discharge 455 m$^3$/day to Rawn Hill Brook.

4.5.5 Until water quality is proven acceptable, the quarry operator will retain the existing infrastructure for pumping over to Oldbury. This will serve as a fallback option in the event of “teething” problems e.g. compliance with water quality targets.

4.6 Drainage from the Plant Site

4.6.1 Runoff from the Plant Site is collected in a number of catchment pits for use in process, with any excess waters being directed to the lagoon system below the quarry office.

4.6.2 The Proposed Development does not involve any change in the Plant Site catchment area i.e. surface materials and gradients will stay the same. The drainage process is already authorised by Discharge Consent T/19/35437/T.

4.6.3 Under this consent, “Site Drainage” is discharged to Oldbury Stream (“a tributary of the River Anker”) via “Outlet A” at NGR 431220 295920.

4.6.4 Maintaining the status quo in this part of the Site and given the existing authorisation, this sub-catchment is not reviewed within the FRA.

4.7 Hydrogeological Setting

4.7.1 The quarry excavations extend along the outcrop of a series of diorite sills. These igneous intrusions occur within the Outwoods Shale Formation, part of the Stockingford Shale Group. These solid strata comprise a Secondary B Aquifer with low groundwater vulnerability.
4.7.2 On a regional scale, the volcanic rocks and shales are mapped as impermeable, generally without significant groundwater except at shallow depth. The rocks have been deformed tectonically and are highly indurated. Groundwater is confined to sub-surface weathered zones and joint systems.

4.7.3 A network of piezometers installed on Site (figure 7 in the HRA) has informed an assessment of groundwater levels in the Secondary B Aquifer.

4.7.4 The levels recorded within the Site piezometers suggest groundwater to reside at around 150 maOD in the area to the southwest of the Oldbury void (including the Western Extension) and 130 maOD in the area to the northeast. Please refer to figure 9 in the accompanying HRA. Correcting for the effects of dewatering, seasonal variations of some 5-7 m are typically encountered at this location.

4.7.5 The natural restoration water level would occur at around 130-135maOD within the Oldbury void. However, the proposed restoration landform will create a low point of 122 maOD at the northern lip of the quarry void; hence, under the proposed configuration, this would be expected to act as the upper limit on surface water levels.

4.7.6 Prior to a previous hydrogeological investigation (completed in 1999), dewatering had ceased in the main excavations at Purley and the void space filled to 118.2 maOD. It was considered that this was representative of long-term equilibrium.

4.7.7 However, when the dewatering operation at Oldbury was scaled down, groundwater levels at Purley rose by a further 1.5 m. Thus, taking a conservative approach, it is anticipated that the long-term water level at Purley would equate to some 120 maOD unless control measures (pumping/overflow) are put in place.

4.7.8 In reality, the intention at Purley is to direct the water through a detention basin and (dependent upon water quality) allow controlled overflow to the Rawn Hill Brook. This will involve suppressing the water level at 115 maOD i.e. 5 m drawdown will be required throughout the life of the proposed development and in perpetuity.

4.7.9 The Site does not overlap any Groundwater Source Protection Zone.
5 APPRAISAL OF THE FLOOD RISK POSED TO THE SITE

5.1 Fluvial and Tidal Flooding

5.1.1 For background information on flood risk in the local area, reference has been made to the EA Modelled Flood Plain Map: 1:100 year (fluvial), 1:200 year (tidal flood) & 1:1,000 year (extreme flood).

5.1.2 The Application Area lies within Flood Zone 1 (“Low Probability”) i.e. less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

5.1.3 The risk of fluvial flooding is confined to (i) the narrow strip of land immediately adjacent the River Anker and (ii) the confluence of the Rawn Hill Brook with the main river. There is some 30 m height difference between the closest stretch of floodplain (75 maOD) and the settlement facilities at the Site entrance (105 maOD).

5.1.4 The Proposed Development falls into the category “Minerals working and processing”. According to Table 2 of PPG, an extract from which is presented below, the Flood Risk Vulnerability Classification for the Proposed Development is defined as “Less Vulnerable”.

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<tr>
<th>Less Vulnerable</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Police, ambulance and fire stations which are not required to be operational during flooding.</td>
</tr>
<tr>
<td>• Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the ‘More Vulnerable’ class; and assembly and leisure.</td>
</tr>
<tr>
<td>• Land and buildings used for agriculture and forestry.</td>
</tr>
<tr>
<td>• Waste treatment (except landfill* and hazardous waste facilities).</td>
</tr>
<tr>
<td>• Minerals working and processing (except for sand and gravel working).</td>
</tr>
<tr>
<td>• Water treatment works which do not need to remain operational during times of flood.</td>
</tr>
<tr>
<td>• Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.</td>
</tr>
</tbody>
</table>
5.1.5 Table 3 of PPG (reproduced below) indicates that the Proposed Development, being classed as “Less Vulnerable”, can be undertaken within any Flood Risk Zone (except 3b).

<table>
<thead>
<tr>
<th>Flood Zones</th>
<th>Flood Risk Vulnerability Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Essential infrastructure</td>
</tr>
<tr>
<td>Zone 1</td>
<td>✓</td>
</tr>
<tr>
<td>Zone 2</td>
<td>✓</td>
</tr>
<tr>
<td>Zone 3a †</td>
<td>Exception Test required †</td>
</tr>
<tr>
<td>Zone 3b ‡</td>
<td>Exception Test required ‡</td>
</tr>
</tbody>
</table>

Key:

✓ Development is appropriate

x Development should not be permitted.

5.1.6 There is therefore no requirement to apply the “exemption test” in this instance. The methodology followed in the derivation of this conclusion is consistent with that presented in Diagram 2 of PPG (Application of the Sequential Test).

5.2 Flooding from Neighbouring Land

5.2.1 The Proposal Site constitutes a sub-catchment that is largely isolated from runoff from adjacent land due to (i) the topographic setting and (ii) the existing surface water drainage network on the agricultural land / golf course.

5.2.2 There is considered to be negligible potential for significant flooding of the Proposal Site from rainfall runoff from neighbouring properties / land.

5.3 Flooding of Oldbury Workings by Runoff from Benches/Tips/Storage Areas

5.3.1 The extended Oldbury workings, including the Western Landform, occupy a catchment area of 47.9 Ha.
5.3.2 Assessment of the implications of storm events has been undertaken in respect of this catchment area (47.9 Ha), assuming a 1 in 100-year storm event, 60 minutes duration. This catchment includes the solid tips at the southern end of the Site and the new overburden storage area in the Western Extension.

5.3.3 Depth Duration Frequency (DDF) data for the Site have been taken from the Flood Estimation Handbook CD Rom (FEHcd).

5.3.4 The FEH DDF rainfall for the design storm event is 43.3 mm. For the 47.9 Ha catchment area, the volume of stormwater requiring storage in the quarry sump equates to \( \text{circa} \ 20,750 \ m^3 \). Spread across the final sinking at the base of the quarry, this would result in \( \text{circa} \ 1.75 \ m \) rise in the water level in the vicinity of the sump during the design storm.

5.3.5 Following abatement of the storm, water will be pumped from the quarry at the designated rate (up to \( 2,600 \ m^3/\text{day} \)), based upon the requirement to maintain dry workings under average conditions. The water will be directed into the existing lagoons (section 4.4.9) situated upon higher ground (130 maOD) at the northern end of the Oldbury void.

5.3.6 The new overburden storage area (Western Landform) in the Extension Area must incorporate a perimeter ditch (section 6.2.3), which should be detailed to discharge into the active quarry workings.

5.3.7 The highest point (172 maOD) upon the perimeter of the landform is roughly midway along the southwest edge, abutting the golf course. This high point is the “watershed” for the perimeter ditch system.

5.3.8 To the north of the watershed, the ditch will have a gradient that allows the water to flow northwards around the northern end of the landform and then eastwards into the Oldbury void.

5.3.9 To the south of the watershed, the ditch will descend around the southern end of the landform and continue downhill eastwards into the closest section of the Oldbury void.

5.3.10 The dimensions of the ditch are described in section 6.2.6.
5.4 Flooding of Purley Workings by Runoff from Benches/Tips/Storage Areas

5.4.1 The Purley workings comprise a catchment area of 17 Ha.

5.4.2 The Proposed Development does not involve any further working of the Purley void.

5.4.3 Therefore, the flood risk assessment for the Purley void focuses upon controlling the rate of runoff from the void space to the receiving watercourse / third-party land.

5.4.4 This element of the FRA is covered in detail in section 6.1.

5.5 Flooding from Groundwater

5.5.1 Comparing groundwater level (135 maOD) with floor level in the deepest part of the workings (50 maOD), it is evident that there will be a requirement for 85 m depth of dewatering drawdown to maintain dry workings in the final development. It is noteworthy that the bulk of this drawdown (65 m) has already been established as a result of the current development.

5.5.2 In line with current practice, following a period of inactivity (e.g. a Bank Holiday), the quarry operator will continue to have the option of running the pump for up to 24 hours per day (equivalent to 2,600 m$^3$/d), which is sufficient to accommodate the anticipated groundwater ingress rate in the enlarged quarry.

5.5.3 The risk posed by flooding from groundwater is deemed manageable. Given that the development is classed as “less vulnerable” in terms of fluvial flooding and can be undertaken within any Flood Risk Zone (except 3b), the same would apply when considering the risk posed by groundwater flooding.
6 APPRAISAL OF THE FLOOD RISK POSED ELSEWHERE WITHIN THE CATCHMENT BY THE PROPOSED DEVELOPMENT

6.1 Controlling Runoff to Third-Party Land / Receiving Watercourse from Purley

6.1.1 The FRA process requires that downstream flooding problems are not exacerbated by run-off from the developed area.

6.1.2 The key requirement relevant to the Proposal Site is as follows: For the range of annual flow rate probabilities up to and including the one per cent annual exceedance probability (1 in 100 years) event, including an appropriate allowance for climate change, the developed rate of run-off into a watercourse, or other receiving water body, should be no greater than the existing rate of run-off for the same event. Run-off from previously-developed sites should be compared with existing rates, not Greenfield rates for the site before it was developed. Developers are, however, strongly encouraged to reduce run-off rates from previously-developed sites as much as is reasonably practicable. Volumes of run-off should also be reduced wherever possible using infiltration and attenuation techniques.

6.1.3 Assessment of the implications of the 100-year storm event has been undertaken in respect of the catchment area (17 Ha) presented by the restored Purley landform.

6.1.4 Depth Duration Frequency (DDF) data for the catchment area have been taken from the Flood Estimation Handbook CDRom (FEHcd).

6.1.5 The employed assessment procedure is based upon calculations and procedures described in a document entitled: “Preliminary rainfall runoff management for developments” (Technical Report W5-074A/TR/1, Revision E), prepared as part of the Flood and Coastal Defence R&D Programme undertaken by Defra and the Environment Agency.

6.1.6 To reflect climate change, a 10% increase in rainfall depth has been factored into the calculations (equivalent to 20% increase in rainfall run-off for larger events).

6.1.7 The aim of the procedure is to ensure that the requisite “Attenuation Storage Volume” (ASV) be incorporated into the development i.e. to store a proportion of rainfall run-off on Site till after the storm has abated.
6.1.8 The water management scheme should also cater for Long Term Storage Volume (LTV): to specifically address the additional volume of runoff caused by the development under average rainfall conditions. This is either infiltrated into the ground or, if this is not possible due to ground conditions, attenuated and discharged at very low rates of flow to the receiving watercourse so as to minimise the risk of exacerbating river flooding.

6.1.9 In terms of attenuation requirements, the findings of the assessment can be summarised as follows:

- Maximum off-site discharge rate: 5 l/s/ha.
- Required attenuation storage volume (ASV): 3,312 m$^3$.
- Required long term storage volume (LTV): 1,607 m$^3$.

6.1.10 Full details of the calculations are presented in appendix 12 of the accompanying HRA.

6.1.11 On the basis of the above calculations, it is proposed that the new drainage infrastructure in the Purley void should include the following key elements:

6.1.12 The first stage of the system should comprise a flow-balancing pond (detention basin). The key is to ensure that there is sufficient capacity to accommodate the total stormwater volume (4,919 m$^3$) e.g. a pond measuring 125 m by 40 m, with a storage depth of 1 m in readiness for the 100-year storm event.

6.1.13 Given the configuration of the quarry floor and subject to advice from the Quarry Manager (e.g. regarding safe depth), alternative dimensions would be acceptable as long as the overall volume (4,919 m$^3$) is safeguarded e.g. the surface area may be increased and the freeboard depth reduced.

6.1.14 The outlet from the flow-balancing pond should be restricted to a flow rate of 5 l/s using orifice plates. Even allowing for a margin of error of up to 1.5 l/s, this flow rate will satisfy the projected average discharge requirement (300 m$^3$/day), which is based upon estimated data derived from current experience (section 4.5.2). The rate will be subject to review once further monitoring data has been collected.
6.1.15 The aforementioned outlet (*i.e.* the pipe restricted to 5 l/s) should be installed at least 1 metre below the brim of the flow-balancing pond (assuming the pond adheres to the dimensions given in section 6.1.12). In this way, 1 m freeboard will be maintained during dry periods, in readiness for the onset of the design storm.

6.1.16 In the event that the design storm is exceeded and the flow-balancing pond reaches full capacity, an overflow facility will be provided to connect directly into the ditch leading to the Rawn Hill Brook.


6.1.18 The proposed discharge rate complies with the volumetric constraints of the existing (but unused) Discharge Consent T/19/07655/T, which permits the Applicant to discharge 455 m$^3$/day to Rawn Hill Brook.

6.2 Controlling Runoff to Third-Party Land / Receiving Watercourse from Oldbury

6.2.1 Currently, all ingress waters in the extraction area at Oldbury (*i.e.* rainfall runoff as well as groundwater input) drain under gravity into the quarry sump (70 maOD).

6.2.2 During a storm event, the sump accommodates rainfall run-off from the active quarry workings (as well as runoff from the incoming stretch of haul road, the quarry benches and the solid tips at the southern end of the landholding).

6.2.3 The new overburden storage area (Western Landform) must incorporate a perimeter ditch, which should be detailed to discharge into the active quarry workings.

6.2.4 At this location, the 100-yr peak rate of runoff per unit area equates to 14 l/s/ha (*item 10.3 within appendix 12 of the accompanying HRA*).

6.2.5 Given that the surface area of the Western Landform will equate to 17 hectares, the perimeter ditch should be designed to accommodate a flow rate of 238 l/s.

6.2.6 Applying the Manning equation (using a coefficient of 0.05) and assuming a gradient of 1 in 100, a ditch/swale with dimensions 1.5 m width by 0.3 m depth would provide sufficient capacity for the above flow rate, safely conveying the runoff from the overburden storage area into the sump at the base of the quarry workings.
In line with current practice, the water from the sump will be lifted into the treatment lagoons by a pump capable of operating at 2,600 m$^3$/d.

Having passed through the lagoons, the water will be piped to the consented discharge point (“Outlet B”, NGR £31230 295950, as per Consent T/19/35436/T) and released into Oldbury Stream.

The proposed discharge rate complies with the maximum permitted rate of discharge (5,237 m$^3$/day).

Given the topographic setting of the quarry sump, water cannot be discharged under gravity. Therefore, the rate of runoff from the extraction area within the Proposed Development will always be controlled by the capacity of the pump. This rate of pumping will not increase above 2,600 m$^3$/d as a result of the continued operation of the Site; thus the proposals are considered acceptable in this regard.

The Application Area lies outside the floodplain.

Therefore, there will be no development-related reduction in floodplain storage.