Hanson Aggregates UK

Westdown Quarry

Flood Risk Assessment

Wood Group UK Limited – January 2021

Report for

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Contents

1. Introduction

1.1 Purpose of this report

1.1.1 This Flood Risk Assessment (FRA) accompanies the Environmental Statement (ES) submission by Hanson Aggregates UK (hereafter referred to as Hanson) to Somerset County Council (hereafter referred to SCC) for the proposed recommencement of mineral extraction and subsequent restoration at Westdown Quarry (hereafter referred to as the Proposed Development), near Frome in Somerset. This report has been produced by Wood Group UK Limited (hereafter referred to as Wood). This FRA has been prepared in accordance with the National Planning Policy Framework[1] (NPPF, 2019) and associated Planning Practice Guidance[2]. Consultation with key stakeholders, including the Environment Agency (EA) and SCC (the Lead Local Flood Authority) has also informed baseline data gathering and the development of the FRA. Further details on consultation in relation to the water environment chapter and FRA are outlined in the **ES Chapter 10: Water Environment**.

1.2 Context

1.2.1 In accordance with the National Planning Policy Framework (NPPF, 2019) paragraph 164 states that a site-specific FRA is required for development proposals that are:

- One hectare (ha) or greater located in Flood Zone 1;
- All proposals for new development located in Flood Zones 2 and 3;
- All proposals for new development located in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency, EA); and
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

1.2.2 In this case an FRA is required as parts of the planning application boundary are within Flood Zones 2 and 3. The site also exceeds 1 ha in area.

1.2.3 This FRA demonstrates how flood risk to the proposed development and any increased flood risk to third parties due to that development, will be managed over the lifetime of the development, taking climate change into account.

1.3 Terminology

Annual Exceedance Probability (AEP)

1.3.1 In this report, the probability of a flood occurring is expressed in terms of Annual Exceedance Probability (AEP), which is the inverse of the annual maximum return period. For example, the 1 in 100 year flood can be expressed as the 1% AEP flood, i.e. a flood that has a 1% chance of being exceeded in any year.

[1] Department of Communities and Local Government. National Planning Policy Framework. London: Department of Communities and Local Government, 2019.

[2] Department for Communities and Local Government. Planning Practice Guidance. 2014. http://planningguidance.planningportal.gov.uk/

1.3.2 **Table 1.1** is provided to clarify the use of the AEP terminology as well a description of the Flood Zone definitions as set out in the NPPF, Flood risk and coastal change guidance.

Table 1.1 Flood Zone definitions and associated annual exceedance probability

Flood Zones	Probability of flooding	AEP	Definition
Flood Zone 1	Low Probability	<0.1% AEP of river or sea flooding	Land with less than 1 in 1,000 probability of flooding from rivers or the sea, in any given year
Flood Zone 2	Medium Probability	1% - 0.1% AEP of river flooding 0.5% – 0.1% AEP of sea flooding	Land with between a 1 in 100 and 1 in 1,000 of river flooding; or land having between a 1 in 200 and 1 in 1,000 probability of sea flooding
Flood Zone 3	High Probability	>1% AEP of river flooding >0.5% AEP of sea flooding	Land having a 1 in 100 or greater probability of river flooding in any year; or Land having a 1 in 200 probability or greater of sea flooding in any year.
Flood Zone 3b	Functional Floodplain	The 5% AEP (or 1 in 20 annual probability) event is often used to help define Flood Zone 3b, the 'functional floodplain', but is not part of the definition	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

1.4 Sources of data and information

1.4.1 Sources of information utilised in this report are detailed below. Data requests/ consultation have also been undertaken with SCC, as the Lead Local Flood Authority (LLFA), and the Environment Agency (EA). Copies of relevant correspondence are provided in **Appendix A** and **Appendix B** respectively**.**

- National Planning Policy Framework (NPPF) (2019), https://www.gov.uk/government/publications/national-planning-policy-framework--2 (accessed 20/10/20);
- NPPF Flood Risk and Climate Change Planning Practice Guidance (2014), https://www.gov.uk/guidance/flood-risk-and-coastal-change (accessed 20/10/20);
- Environment Agency (2020) Flood risk assessments: climate change allowances Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk) accessed 16/12/20;
- Environment Agency Flood Map for Planning Service https://flood-map-for-planning.service.gov.uk (accessed 18/08/2020);
- Environment Agency Long Term Flood Risk Map https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed (accessed 18/08/2020);
- Somerset County Council (2011) Preliminary Flood Risk Assessment Report, https://www.somerset.gov.uk/waste-planning-and-land/flood-and-water-management/;
- Somerset County Council (2014) Local Flood Risk Management Strategy, Somerset's flood risk management strategy for surface water, groundwater and ordinary watercourses, https://www.somerset.gov.uk/waste-planning-and-land/flood-and-water-management/;
- Mendip District Council (2020) Strategic Flood Risk Assessment https://www.mendip.gov.uk/article/9110/Strategic-Flood-Risk-Assessment;

- Environment Agency (2012) Bristol Avon Catchment Flood Management Plan https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/294182/Bristol_Avon_Catchment_Flood_Management_Plan.pdf;
- Somerset County Council (2015) Somerset Minerals Plan Development Plan Document up to 2030, https://www.somerset.gov.uk/waste-planning-and-land/somerset-minerals-plan/;
- Somerset County Council (2013) Minerals Plan Strategic Flood Risk Assessment – Update November 2013 http://webcache.googleusercontent.com/search?q=cache:aaF-0zcWVZwJ:www.somerset.gov.uk/EasySiteWeb/GatewayLink.aspx%3FalId%3D45179+&cd=1&hl=en&ct=clnk&gl=uk;
- Somerset County Council (2011) Minerals and Waste Development Framework, Strategic Flood Risk Assessment http://webcache.googleusercontent.com/search?q=cache:0UGhwAAC_KoJ:www.somerset.gov.uk/EasysiteWeb/getresource.axd%3FAssetID%3D51325%26type%3Dfull%26servicetype%3DAttachment+&cd=2&hl=en&ct=clnk&gl=uk ; and
- Somerset County Council (2015) West of England Sustainable Drainage Developer Guide, Issue 1, https://www.bristol.gov.uk/documents/20182/34524/West+of+England+sustainable+drainage+developer+guide+section+1/864fe0d2-45bf-4240-95e2-a9d1962a0df9.

1.5 Structure of this report

1.5.1 The report is structured as follows:

- **Section 2** – Site Description, Development Proposals and Planning Context;
- **Section 3** – Flood Risk Assessment;
- **Section 4** – Surface Water Management;
- **Section 5** – Flood Risk Mitigation;
- **Section 6** – Compliance with Requirements of the LLFA; and
- **Section 7** – Conclusions and Recommendations.

1.5.2 The figures are embedded within the main body of the report while various supporting documents are presented at the end of the report in the form of appendices. These are as follows:

- **Appendix A** contains details of the consultation with SCC;
- **Appendix B** contains details of the correspondence and data provided by the Environment Agency;
- **Appendix C** contains photos of the Fordbury Water and borehole logs for the Site;
- **Appendix D** contains outline plans for the proposed working and restoration phases of the development; and
- **Appendix E** contains a technical note with the proposed surface water drainage for the Site.

2. Site description, development proposal and planning context

2.1 Site description

2.1.1 Westdown Quarry is a dormant limestone quarry which has not been substantially worked since the late 1980s. The quarry is located approximately 5 km to the southwest of Frome, in Somerset (National Grid Reference (NGR) ST 719 661). The site location is shown on **Figure 2.1** and **Figure 2.2.** The planning application boundary (hereafter referred to as the Site) covers an area of approximately 67.4 hectares (ha).

2.1.2 The site is effectively split into two parts by the Fordbury Water watercourse, as indicated in **Figure 2.3**:

- Westdown Quarry – to the east of Fordbury Water; and
- Asham Wood Void – to the west of Fordbury Water.

2.1.3 The Westdown Quarry part of the site includes the operational areas, haul roads, storage mounds/screening bunds. The Asham Wood Void area is a former mineral working area which is surrounded by woodland on all sides, and to the north west there is a small gully feature which runs through the woodland and perpendicular to the Fordbury Water. Westdown Quarry is bounded to the north by the Bulls Green Link Road (quarry link road constructed in the 1990's) and by the A361 to the south. To the west of the quarry is Asham Wood Void and to the east are agricultural fields.

2.1.4 The Site is covered by the following three existing minerals consents:

- Westdown Quarry:
  - Interim Development Consent Order (IDO) permission reference IDO/M/1/A (original planning reference 70 - dated 1 November 1947) registered as an IDO on 23 October 1992. This covers the Westdown Quarry area and extends across an area of approximately 54ha; and
  - Review of Old Minerals Planning Permission (ROMP) reference 016248/005 for the winning and working of limestone - Approval of Schedule of Conditions dated 4 November 1998. This ROMP consolidates two separate parcels of land to the north-east of IDO/M/1/A and an area within the southwest of IDO/M/1/A, collectively covering an area of approximately 14ha.
- Asham Wood Void:
  - IDO permission reference IDO/M/4/A (original planning reference 1492 - dated 28 June 1948) registered as an IDO on 27 October 1992. This permission covers the Asham Wood Void area and extends across an area of approximately 32.3ha.

2.1.5 Although the existing permissions do not expire until 21 February 2042, legislation requires that no further quarrying can commence until there is a determination of conditions pursuant to the Planning and Compensation Act 1991 in respect of the IDO permissions and determination of a full working and reclamation scheme (pursuant to condition 3) of the ROMP permission (in accordance with the Environment Act 1995).

2.1.6 Wide scale extraction has already taken place in the Asham Wood Void area and in the north-western part of the Westdown Quarry and whilst there are no remaining consented reserves left in Asham Wood Void, Westdown Quarry contains approximately 160 million tonnes (mt) of unworked Mendip limestone.

2.1.7 There are three other quarries in the area surrounding the Site. These include Hanson's Whatley Quarry located approximately 1.3km to the north of the Site, Aggregates Industries' Torr Works Quarry located approximately 0.3km from Site, and Aggregate Industries Colman's Quarry Complex adjacent to the southwest of the Site on either side of the A361 Holwell Hill Road.

2.1.8 The nearest residential receptors are properties located in the hamlets of Chantry and Cloford, approximately 1km north and south of the Site, respectively and the village of Nunney, located approximately 1.5km east of the Site. There are isolated properties located within approximately 0.2 to 0.5km north of the Site. There is also a farmhouse located approximately 0.75km west of the Site and west of Asham Wood Void, off Tunscombe Lane.

2.2 Topography

2.2.1 The topography of the general area slopes to the east, following a general eastward incline. The Fordbury Water watercourse cuts through this eastward-sloping landscape in a steep sided valley, thus bisecting the site itself (Ashdown Void to the west and Westdown Quarry to the east) and locally resulting in slopes towards the watercourse and thus creating a catchment divide on the Westdown Quarry side of the Site.

2.2.2 The catchment divide on the Westdown Quarry side of the site occurs approximately across its centre. In the northern half (which includes the former workings of Westdown Quarry) the topographic profile undulates to the north west from a mound at approximately 170m AOD to the base of the former quarry at approximately 138m AOD. Continuing westward, elevations then rise slightly to approximately 160m AOD before dropping into the Fordbury Water valley approximately at approximately 132m AOD (**Figure 2.1**).

2.2.3 In the southern half of the proposed Westdown Quarry area the ground gently slopes from the mound at approximately170m AOD to the south east beyond Westdown Farm at approximately150 m AOD to the south eastern boundary of the Site at the junction with the A361 approximately142m AOD. To the south east of the Site the land continues to slope gently towards the base of the Nunney Brook at approximately 112 m AOD.

2.2.4 Elevations on the Asham Wood Void part of the site show an overall increase from the base of the Fordbury Water (approximately 135m AOD) up to approximately 179m AOD at the north western corner of the Site. The land profile is relatively flat to the north of the Fordbury Water in the vicinity of the former workings which are approximately at the same level at the Fordbury Water. The former worked area then slopes to the north west to a level of 146m AOD suggesting Asham Quarry has been worked to approximately 11m below ground level, while the topography at Westdown is more natural. Outside of the Site to the north west the land continues to rise to an elevation of approximately 200m AOD at the top of the watershed near Torr site offices.

2.3 Hydrology and Drainage

Watercourses

2.3.1 The Site is situated within the catchments of the Fordbury Water and the Nunney Brook, which are both tributaries of the River Mells (**Figure 2.2**).

2.3.2 Fordbury Water bisects the site, with the Asham Void part of the site draining towards this watercourse. The northern half of the proposed Westdown Quarry area also drains into the Fordbury Water, which flows in a north easterly direction through the Site and joins the River Mells at Great Elm approximately 4.1km to the northeast of the Site. The southern half of the proposed Westdown Quarry area drains towards the south and east into the Nunney Brook, which is situated approximately 0.55km to the southeast of the Site. The Nunney Brook flows in a north easterly direction prior to discharging into the River Mells which is a Main River at Vallis Farm, approximately 4.9km to the northeast of the Site.

2.3.3 The section of the Fordbury Water which flows through the Site is designated as an Ordinary Watercourse and becomes a Main River (named Whatley Brook) approximately 480m to the northeast (downstream) of the Site. It is noted that the names Fordbury Water and Whatley Brook are used commonly interchangeably on OS mapping for this watercourse but in this report it is referred to as Fordbury Water. The Nunney Brook and the River Mells are designated as Main Rivers.

2.3.4 The EA have provided flow data for the gauging station Nunney on the Nunney Brook (Station No. 531220) located approximately 1.3km to the northeast of the Site (**Figure 2.2**). The river flows and catchment information for this location is shown in **Table 2.**.

Table 2.1 River flows and catchment information for Nunney Brook

Flow Gauging Descriptor	Nunney Brook (Nunney) Station Information
NGR	ST 73667 46238
Catchment area (km^2)	17.8 km2
BFI (Base Flow Index)	0.59
Q10 flow (m^3/s)	0.76
Mean flow (m^3/s)	0.33
Peak Recorded Flow on 1st Jan 2008 (m^3/s)	20.2
Flow record period	1998 – 2008
Mean Annual Rainfall (MAR, mm)	1127
HER* (mean flow/catchment area) (mm/year)	568
HER as % Rainfall	50.3

Notes: Flow gauging data provided by the EA
*HER- hydrologically effective rainfall

2.3.5 Discrete spot flow gauging was carried out by Wood to support a baseline hydrological understanding in the catchment for the ES. This included monitoring on the Fordbury Water at two locations in the vicinity of the Site during three monitoring rounds between August and November 2018. The monitoring locations include a location within the Site boundary and a location approximately 50m downstream of the Site (**Figure 2.2).** The monitoring data is provided in **Table 2.2** and indicates that the flows are higher at the downstream location in 2018.

Table 2.2 Flow Gauging Monitoring Results for Fordbury Water

Location	21st August 2018 Total Daily Flow (Ml/d)	26th September 2018 Total Daily Flow (Ml/d)	7th November 2018 Total Daily Flow (Ml/d)
Within the Site (ST71350 45634)	5.86	10.35	13.64
50m downstream of the Site (ST716814 5967)	6.27	11.33	17.87

2.3.6 Photographs of Fordbury Water obtained during the site visit on the 21st August 2018 are provided in **Appendix C**. The Site visit indicates that Fordbury Water is a gradually meandering channel with pools and riffles and some wooded debris. The watercourse channel ranges between 0.5m and 2m in width and 0.2m to 0.4m in depth. It is situated in a steep sided valley which has a height change of approximately 14m to 18m from the bottom of the valley (132m AOD) to the ridge crest of the valley (146 – 150m AOD) on its southern side, between the watercourse and the Westdown Quarry area. The flow is regulated at Westdown weir (ST 71346 45615) approximately 180m to the north of the Westdown Quarry.

Site Discharge

2.3.7 There are currently no water discharges from the Site. The nearest water discharge is from the neighbouring operational quarry, Aggregates Industries' Torr Works Quarry, which discharges the bulk of its dewatering directly to the Fordbury Water approximately 0.54km upstream of the Site (ST 69933 44299). Torr Works quarry and Coleman's quarry complex also provide augmentation to the Nunney Brook from header tanks related to Torr Works Quarry (ST 67946, 42679) and Coleman's quarry complex (ST72880, 14495) approximately 0.55km to the southeast of the Site.

2.4 Geology, hydrogeology and soils

i. The geology, hydrogeology and soils baseline at the Site are described in detail in ES **Chapter 10: Water environment**. A summary is provided below.

2.4.1 The BGS online geological mapping indicates that there are no superficial deposits at the Site except for a localised area of Head deposits (clay, silt, sand and gravel) near the western edge of the Westdown Quarry (there are no superficial deposits beneath the Fordbury Water/ Whatley Brook within the Site).

2.4.2 The bedrock geology underlying the Site comprises the Black Rock Limestone Subgroup of the Carboniferous period on the northern part of the Site, including Asham Wood Void, the northern area of Westdown Quarry and the Fordbury Water watercourse. The central part of the Site including most of Westdown Quarry is underlain by the Inferior Oolite Subgroup of the Jurassic period. The southern edge of the Site is underlain by the Vallis Limestone Formation from the Carboniferous Period.

ii. The Nunney Brook is underlain by Alluvium (clay, silt, sand and gravel) approximately 0.7km to the south of the Site. The bedrock geology in this area comprises the Forest Marble Formation and Inferior Oolite of the Jurassic period.

2.4.3 Online mapping (Defra, 2020) indicates that the Black Rock Limestone Subgroup and Inferior Oolite Group are classed as Principal Aquifers. These are defined as layers of rock that have high intergranular and/or fracture permeability (high level of water storage) which may support water supply and/or river base flow on a strategic scale. The small area of Head deposits on the western edge of the Westdown Quarry is classified as a Secondary (undifferentiated) aquifer, i.e. lower permeability formations that may have local scale importance for water supply and river baseflow depending on localised features.

iii. Geological logs for boreholes within Asham Wood Void area indicate that the Black Rock Limestone is encountered beneath approximately 2m of overburden and is present to depths of at least 102m (approximately 38m AOD). The logs also indicate a high degree of fracturing in places, as well as the presence of shale/limestone alterations that range from 5 to 10m in thickness (BGS, 2020). Groundwater levels have been monitored by Hanson on a monthly basis within the Site since 1994 at two boreholes in the Asham Wood Void area and one in Westdown Quarry (**Figure 2.2**). Groundwater levels at the three boreholes over period 1994 to 2020 are provided in **Appendix C** and show that:

- ASHAMQ1 (NGR ST 70627, 45184) data before 2002 shows groundwater levels fluctuating seasonally between 133m AOD (11 mbgl) during summer/early autumn and 140m AOD (4 mbgl) during winter, with a mean groundwater level of 135.4m AOD (8.6 mbgl). Groundwater levels dropped after 2002 to 122m AOD (22 mbgl) during summer and 134m AOD (10 mbgl) in winter, with a mean groundwater level of 129.6m AOD (14.4 mbgl);
- ASHAMQ2 (ST71057, 45444) data before 2002 showed annual fluctuations in groundwater levels smaller than those observed in Boreholes 1 and 3, ranging between 131.5m AOD (3 mbgl) and 134 (0.5 mbgl) and a mean level of 132.7m AOD (1.8 mbgl). From 2002, the summer groundwater levels dropped to around 124.5m AOD (10 mbgl), while winter levels drop to 133m AOD (1.5 mbgl), with a mean groundwater level of 129.6m AOD (4.9 mbgl);
- ASHAMQ3 (ST71485, 45475) show a similar pattern is observed to that in Borehole 1. Before 2002 groundwater levels ranged between 122.4m AOD (12 mbgl) and 133.41m AOD (1 mbgl), with a mean level of 127.2m AOD (7.2 mbgl). From 2002 onwards, the summer lows dropped to around 118.4m AOD (16 mbgl), while winter highs fell to around 129.41m AOD (5 mbgl), with a mean groundwater level of 123.3m AOD (11.14 mbgl);
- Each of the borehole logs indicate that there has been a downward trend in their groundwater minimum levels recorded since 2002, and this is likely due to the influence of the deepening at the neighbouring Torr Works Quarry. This is indicated to be more pronounced during drier summer periods. The borehole logs also indicate that overall the groundwater flows in a north easterly direction from ASHAMQ1 in the Asham Wood void area towards the Westdown Quarry area at ASHAMQ3. This observed trend follows the topographic slope of the wider area to the east, through which the Fordbury Water bisects within a steep sided valley; and
- Groundwater flow patterns vary during periods of high and low groundwater levels. During wetter periods, a gentle hydraulic gradient from higher levels at ASHAMQ1 to lower levels at ASHAMQ3 is observed, indicating that the river is draining the groundwater flows from the aquifer. During drier periods, there appears to be elevated

groundwater levels converging at ASHAMQ 2, located in close proximity to the Whatley Brook, suggesting the aquifer is locally recharged via stream losses.

2.4.4 The Cranfield University Soilscapes website (Cranfield University, 2020) indicates that soils at the Site comprise shallow lime-rich soils in Westdown Quarry areas and freely draining slightly acid loamy soils at Asham Wood Void area including the Fordbury Water valley.

2.5 Development Proposal

2.5.1 Hanson is proposing to recommence mineral extraction at Westdown Quarry and extract approximately 2.0mt per annum of aggregate grade limestone from the quarry over a period of 21 years, from 2021 to 2042, and it is anticipated that the restoration works will be completed by the end of 2044. Working phase and restoration plans are included in **Appendix D**.

2.5.2 The proposed worked scheme is outlined below:

- Mineral extraction will start on the western part of the quarry, and over time, move in a south-easterly and then northerly direction over a series of five separate phases. Output from the quarry would not exceed 2.0mt per annum. At its deepest the base of the excavation will be approximately 106m AOD (approximately 49m below current ground level);
- The limestone will be extracted through drilling and blasting techniques. The quarried mineral will be processed on site by primary mobile plant at the base of excavations before being processed further at secondary fixed plant and then stockpiled within the site, ready for onward transportation by road to local and regional markets. There will be no stockpiling within Flood Zones 2 and 3;
- Any top and sub-soils which require removal will be placed in bunds no higher than 3m around the perimeter of the Site and it is anticipated that overburden material (oolite) and inert quarry waste generated throughout the production process will be used as restoration fill material in the Asham Wood Void area of the site. This material will be transported to Asham Wood Void area using an existing watercourse crossing over the Fordbury Water. The restoration within the Asham Wood area will be carried out in a west - east direction in parallel to the Fordbury Water channel, and will be kept outside of Flood Zones 2 and 3;
- The Westdown Quarry will be worked dry by pumping. Associated with the depth of excavation, it is likely that the proposed workings will encounter quantities of groundwater from Phases 1-3, with more substantial quantities in Phases 4 and 5. Groundwater and surface water entering the quarry workings will be pumped from the base of the workings into a quarry sump (to be located in the north-eastern part of the Westdown Quarry void) and associated settlement system before discharging to Fordbury Water in the vicinity of the north western corner of the Site under a new discharge consent for the Site **(Figure 2.3)**; and
- The main Westdown Quarry area will be restored with a lake **(Appendix D)**. All other things being equal, i.e. dewatering of nearby quarries continuing (or new quarries occurring) initial groundwater level estimates indicate that groundwater levels (and thus lake levels) are estimated to equilibrate at approximately 120m AOD. It is possible that groundwater levels could rise above this in the instance that all dewatering in the surrounding area ceased, but this is considered an unlikely scenario given the long term viability of quarry operations in the surrounding area. .

2.5.3 The development will also include the following:

- Weighbridge, offices, wheelwash, fixed plant, stocking and vehicle parking area in the far-north eastern section of the Westdown Quarry part of the Site;
- Mineral processing plant in the northern section of the Site;
- Access ramping into and out of the quarry working areas; and
- Temporary soil and overburden bunding adjacent to quarry working areas.

2.5.4 Once restored the only public access will be via an existing and new footpath in the Asham Void Area as shown on the restoration plan in **Appendix D**. There will be no public access to the Westdown Quarry area.

2.6 Planning Context

2.6.1 Policy and relevant guidance to this FRA includes the following:

- Somerset County Council Preliminary Flood Risk Assessment (2011 and 2017 update): this document provides a high-level overview of flood risk and historical flooding in SCC administrative area from a variety of flood sources (surface water, groundwater, ordinary watercourses and canals). This information was used to formally identify Flood Risk Areas to comply with the European Union (EU) Floods Directive. The Site is not shown to be within an identified Flood Risk Area;
- Mendip District Council Level 1 Strategic Flood Risk Assessment (2020): this provides a strategic assessment of flood risk to feed into the local development planning process. It provides a summary of flood risk in the area including local mapping of flood risk from all sources and guidance on flood risk. The flood risk maps, set out within Map B in the document, show that the north western part of the Site (including partial areas to the south of Asham Wood Void) is within Flood Zones 2 and 3 and the southern and eastern areas (including the Westdown Quarry) are within Flood Zone 1. Flood Zone 3b (the functional floodplain) is not identified/delineated in the SFRA. The surface water flood risk maps indicate that most of the Site is at very low floor risk of surface water flooding. The groundwater flood maps indicate that the southern and eastern part of the Site (including the Westdown Quarry) are within an area with limited potential for groundwater flooding to occur whilst the northern and western part of the Site (including Asham Wood Void area and Fordbury Water) are within an area with potential for groundwater flooding to occur at the surface;
- Somerset County Council Strategic Flood Risk Assessment Level 1 (2011): This document was undertaken by SCC to support the minerals and waste local development framework. It reviews the flood risk policy, analyses the flood risk data, provides guidance to SCC for flood risk policy and future flood risk management decision making, provides supporting evidence to support SCC in the preparation of their Local Plan and provides guidance to developers in Sustainable Drainage Systems (SuDS);
- Somerset County Council Local Flood Risk Management Strategy (2013) sets out SCC's duties, responsibilities and strategy to manage the impact of flooding from 'local' sources, i.e. surface water, groundwater and ordinary watercourses. It also includes investigation of flood incidents, decision making about third party works on ordinary watercourse that may affect water flow and other works related to the maintenance of riparian watercourses;

- Bristol Avon Catchment Flood Management Plan (2012) provides an understanding of the scale and extent of current and future flooding in the wider catchment, sets policies for managing flood risk within the Bristol Avon catchment and promotes more sustainable approaches to managing flood risk. The plan does not specifically identify the Site or areas within its vicinity; and
- West of England Sustainable Drainage Developer Guide (2015): provides information on the planning, design and delivery of attractive and high quality SuDS schemes across the West of England and Somerset which should offer multiple benefits to the environment and community alike.

The Sequential Test

2.6.2 The Sequential Test is set out in the NPPF[1] and explained further in the accompanying Planning Practice Guidance. A sequential, risk-based approach to the location of development is required, both in terms of locating the site itself (the Sequential Test) and then the layout of the site (a sequential approach within the site). The Sequential Test aims to direct new development to the areas of lowest flood risk by a process of appraising other reasonable available sites within a suitable 'area of search'. Only when it is confirmed that there are no other suitable sites will development be permitted in areas of Flood Zone 2 and then sequentially Flood Zone 3. Even then, the development must account for the flood risk vulnerability of the proposed land use and to apply the Exception Test if required.

2.6.3 Although the site does not show as a current mineral allocation in the Somerset Minerals Local Plan[3] (identified as dormant), the site already has planning consent, covered by the three existing minerals consents discussed in **Section 2.1**, covering both Westdown Quarry and Asham Wood Void. The existing permissions do not expire until 21 February 2042; however, legislation requires that no further quarrying can commence until there is a determination of conditions pursuant to the Planning and Compensation Act 1991 in respect of the IDO permissions and determination of a full working and reclamation scheme (pursuant to condition 3) of the ROMP permission. Working can recommence once an updated schedule of conditions (supported by an EIA) has been attached to the consents. As such, it is deemed that the Sequential Test can be deemed passed provided the wider environmental impacts are deemed acceptable.

2.6.4 The NPPF also requires that a sequential approach should be applied to the layout and design when allocating land for development and land use types within development sites.

The Exception Test

2.6.5 The Exception Test, as set out in paragraph 160 of the NPPF, is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in national planning guidance.

2.6.6 Under the NPPF and the accompanying Guidance, the proposed limestone quarry has been assigned a flood risk vulnerability classification of 'Water Compatible' (assuming that it has a similar vulnerability classification to 'sand and gravel working') and the Site infrastructure (office, welfare and mineral processing plant) as 'Less Vulnerable' (offices and general industry). **Table 2.3**, reproduced from the NPPF online flood risk matrix, indicates that, for 'Water Compatible' and 'Less

[3] Somerset County Council, 2015. Somerset Minerals Plan: Development Plan Document up to 2030. Adopted February 2015. Available online at: http://www.somerset.gov.uk/EasySiteWeb/GatewayLink.aspx?alId=98609.

Vulnerable' development within Flood Zones 1, 2 and 3a the development is acceptable and the Exception Test does not need to be applied.

Table 2.3 Flood Risk Vulnerability and Flood Zone 'Compatibility'[4] Matrix

Flood Risk Vulnerability Classification	Essential Infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a*	Exception Test required*	✗	Exception Test required	✓	✓
Zone 3b**	Exception Test required**	✗	✗	✗	✓**

✓ Development is appropriate
✗ Development should not be permitted
*In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
** In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to: remain operational and safe for users in times of flood; result in no net loss of floodplain storage; not impede water flows and not increase flood risk elsewhere.

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf

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371000

372000

146000

145000

N

Shearmoor Stream

Fordbury Water/ Whatley Brook

Nunney Brook

A361

Key

Westdown consolidating planning submission area

Topographic contour (m)

0 100 200 300 400 m

Scale at A3: 1:7,500

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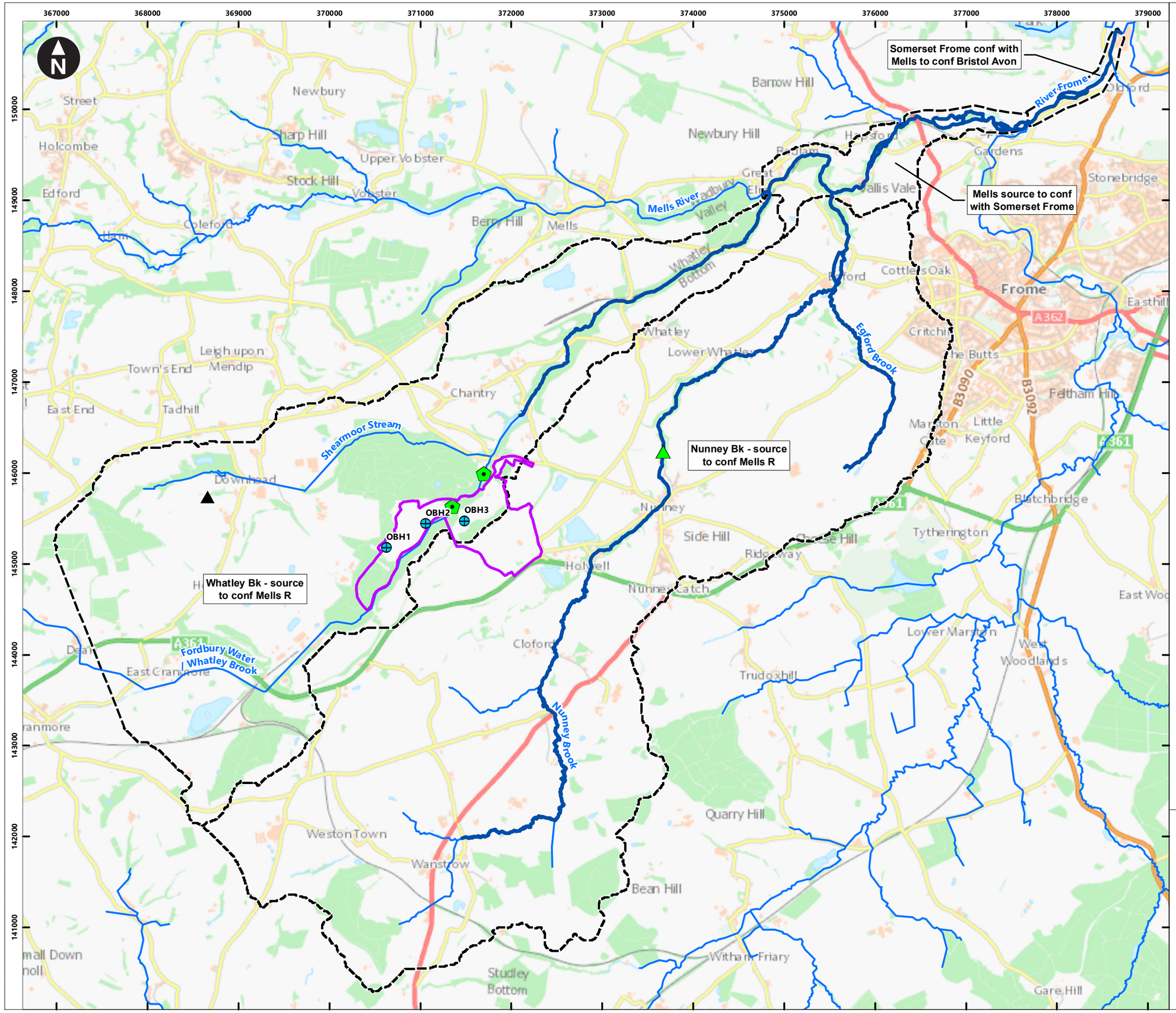
Westdown Quarry Consolidating Planning Submission
Flood Risk Assessment

Figure 2.1
Site location and topography

April 2021

wood.



Key

- Westdown consolidating planning submission area
- Main river
- Watercourse
- WFD river water body catchment

Hydrometric Stations

- EA flow gauge, Nunney
- EA raingauge, Downhead Reservoir
- Wood flow monitoring point
- Observation boreholes (OBH)

0 500 1,000 1,500 2,000 m

Scale at A3: 1:40,000

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Westdown Quarry Consolidating Planning Submission
Flood Risk Assessment

Figure 2.2
Catchments, watercourses and hydrometric stations

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wood.

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N
Bams Close Quarry
Finger Farm
The Hare Warren
Hale Combe
Rookery Farm
Limeklin La
Somers Hill
Knap Hill
Knaphill Farm
Leigh Rd
Green La
Mendip View
Holybush La
Bartle La
Bound La
Chantry
Green Farm
Shearmoor Wood
Castlehill Wood
Bordenham's Coppice
Bowcombe Coppice
Asham Wood
Dead Wo... Bottom
Shearmoor Stream
Little Manor
Lodge Hill Manor
Leighton
Broadgrove House
Cloford
Nunney Brook
Fordbury Water/ Whatley Brook
Asham Wood Void
Westdown Quarry
1 - 5
2 - 5
3 - 5
4 - 5
5
FRR1
FRR2
FRR3
FRR4
FRR5
FRR6
FRR7
FRR8
FRR9
FRR10
FRR11
Old School House
Bangle Farm
Cottage
Southfield House
The Bushes
Whatley
Nunney
Nunney Brook
Holwell
Holwell Hill
A361
Nunney Cat...
Marston...
Castle Hill
Primrose Hill
Berry Hill
Glaceland
Green Pitch La
Catch Rd
Ratford Bottom
Ratford Hill
Hom St
Key
Westdown consolidating planning submission area
Water body
Watercourse
Westdown Quarry area (including mineral extraction phase)
Indicative sump location
Indicative discharge point
Haul road
Soil storage bund
Oolite storage
Asham Wood restoration area
Potential flood risk receptor
0
200
400
600
800 m
Scale at A3: 1:15,000
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Westdown Quarry Consolidating Planning Submission
Flood Risk Assessment
Figure 2.3
Excavation and restoration areas and flood risk receptors
April 2021
wood.
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370000
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N
Mendip View
Shearmoor Wood
Shearmoor Stream
Castlehill Wood
Bodkenham's Coppice
Baucombe Coppice
Asham Wood
Green Farm
Bangle Farm
Lodge Hill Manor
Asham Wood Void
Westdown Quarry
1 - 5
2 - 5
3 - 5
4 - 5
5
Westdown Fa
Fordbury Water / Whatley Brook
Tonigre Cottage
Cloford
Broadgrove

Key

- Westdown consolidating planning submission area
- Watercourse
- Water body
- Westdown Quarry area (including mineral extraction phase)
- Indicative sump location
- Asham Wood restoration area
- Indicative discharge point
- Haul road
- Soil storage bund
- Oolite storage
- Environment Agency Flood Zone 3
- Environment Agency Flood Zone 2
- Environment Agency Flood Zone 1

0 200 400 600 m

Scale at A3: 1:10,000

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ontains Environment Agency information © Environment Agency and/or database right.

Westdown Quarry Consolidating Planning Submission
Flood Risk Assessment

Figure 2.4
Environment Agency fluvial flood risk map for planning

April 2021

wood.

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3. Flood Risk Assessment

3.1 Screening of all potential sources of flood risk

3.1.1 **Table 3.1** provides an initial screening of all potential flood risk across the site. Those that are screened in as posing a potential flood risk are then discussed in the subsequent sections.

Table 3.1 Screening of all potential sources

Source of Flooding	Potential Connection to Site	Screened In?
Fluvial	The Fordbury Water watercourse passes through the centre of the site and parts of the site are in Flood Zones 2 and 3. Fluvial flooding is assessed in **Section 3.3**.	Yes
Tidal	The Site is located some distance from the sea and will remain over 100m AOD. Owing to the lack of source, the risk of tidal flooding in the area is considered to be low and is not considered further in this assessment.	No
Surface water flood risk - run-on and runoff	The EA's Surface Water Flood Risk Map shows small discrete areas of the Site have low (0.1% Annual Exceedance Probability) to high surface water flood risk (>3.3%AEP) pathways situated within topographic low areas. Surface water flooding is assessed in **Section 3.4**.	Yes
Groundwater	The Site is underlain by permeable Black rock limestone with relatively shallow groundwater levels as discussed in **Section 2.4**. Groundwater flooding is assessed in **Section 3.5**.	Yes
Sewer	The Site is situated away from developed areas and it is anticipated that there are few sewer drainage networks in the vicinity of the Site within which water levels could feasibly rise to an extent that would result in flooding of the site. Any flows surcharging from minor sewer systems associated with nearby farm buildings would be expected to be minimal/intercepted by the local watercourses. On this basis, owing to the lack of source, the risk of sewer flooding in the area is considered to be low and is not considered further in this assessment.	No
Artificial	There are no artificial sources (such as reservoirs and canals) of flood risk in the vicinity of the Site. The EA's Flood Risk from Reservoirs Mapping (EA, 2020) shows that the Site is not within a flood risk area. No raised bodies of water are proposed as part of the development. Owing to the lack of source, the risk of sewer flooding in the area is considered to be low and is not considered further in this assessment.	No

3.2 Historical Flooding

3.2.1 The Mendip District Council SFRA (JBA, 2020) indicates that there are no historical known flooding incidents in the immediate vicinity of the Site. The nearest flood incident to the Site, approximately 1.3km to the east, relates to fluvial flooding from the Nunney Brook at five properties in Nunney in 1968. It should be noted that historical flooding information presented in the SFRA is not an exhaustive assessment as it only shows known instances of flooding – some flood incidents will not have been recorded.

3.2.2 SCC have no records of historical flooding at or in the vicinity the Site (**Appendix A**). The closest records were for incidents of surface water flooding and fluvial flooding from the Nunney Brook approximately 1.3 – 1.5km east of the Site between 1995 and 2008 which affected several properties and local roads.

3.2.3 The EA have advised that the fluvial flood extents for the Fordbury Water are based on modelling only, with no historical event component.

3.3 Fluvial Flooding

Working Phase

3.3.1 The EA Flood Map for Planning covering the proposed development area is presented on **Figure 2.4** and shows that most of the proposed development area, including the Westdown Quarry and Site infrastructure (office, welfare and mineral processing plant), is within an area that currently is considered to be at low probability of flooding (Flood Zone 1) from rivers (or the sea). Parts of the proposed development area near and to the west of Fordbury Water, including parts of Asham Wood Void, are situated within an area with high or medium probability of flooding (Flood Zones 2 or 3 respectively), and ground levels on the Westdown Quarry side of the site are to be excavated thus potentially increasing the risk in that area too. The source of flood risk in this area is associated with fluvial flooding at Fordbury Water.

3.3.2 A number of potential fluvial flood risk receptors have been identified, as shown in **Figure 2.3**. These are:

- FRR7 Domestic properties downstream of Stony Lane crossing;
- FRR8 Domestic properties upstream of Stony Lane crossing;
- FRR9 Domestic property along Railford bottom; and
- FRR10 Hanson UK Site Offices and Whatley Quarry Infrastructure.

3.3.3 Fluvial flood modelling results for the Fordbury water (Product 6 data) were provided by the EA. These included flood depth and extent data for the 0.1% AEP and 1% AEP events (no climate change allowance) for the area as modelled in the Bristol Avon Model (2006). No other model results were provided. The modelled 0.1% AEP and 1% AEP flood extents coincide with Flood Zones 2 and 3 respectively.

3.3.4 In the absence of any modelled flood levels that include a climate change allowance, the Flood Zone 2 (0.1% AEP) extents has been used as a proxy in this FRA for indicative floodplain extent with climate change. This is on the basis that the Environment Agency guidance[5] indicates that for water compatible land use (based on gravel and sand workings) a central estimate of climate change allowance should be used. The central estimate of climate change allowance for the Severn region is a 20% increase in peak fluvial flows for the 2040s (2040 by 2069) considered relevant for the operational and restoration phases (as noted in **Section 2.5**, it is anticipated that the restoration works will be completed by the end of 2044). The use of the 0.1% AEP results for this assessment is considered conservative in that the 1% AEP +20% extents and depths are unlikely to exceed those associated with the 0.1% AEP event.

3.3.5 Ground levels in the Westdown Quarry side of the site will be excavated to a low point of approximately 106m AOD (approximately 49m below current ground level). As noted, the bottom of the adjacent Fordbury Water valley is at approximately 132m AOD, thus indicating a potential fluvial flood risk to the Westdown Quarry from the adjacent Fordbury Water watercourse. However, the watercourse will be separated from the quarry by a ridge of higher ground which will not be worked, between the steep- sided valley of the watercourse and the quarry itself. This ridge of high ground will be approximately 14m to 18m in height, with a crest of 146m AOD to 150m AOD. The

[5] Environment Agency, 2020. Flood risk assessments: climate change allowances. Available online at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

modelled flood depth extents provided by the Environment Agency indicate peak water levels during the 1% and 0.1% AEP event of approximately 136m AOD[6], thus providing approximately 10 m freeboard between the peak modelled flood levels and the crest of the ridge that will protect the quarry from fluvial flooding. All other associated ancillary activities including the site office, weighbridge, wheel washing, mineral processing plant, vehicle parking, access ramping, and soil bunding will also be sited in Flood Zone 1 and elevated above 146m AOD at on the southern side of the valley of Fordbury Water (**Appendix D**).

3.3.6 There will be no activities carried out within Flood Zones 2 and 3 other than vehicles transporting material along an existing haul road from the Westdown Quarry area to the Asham Wood void area. It is proposed to use the existing track crossing (ST 71344 45568) over Fordbury Water to transport overburden material (oolite) and inert quarry waste to Asham Wood Void (**Figure 2.4**). Hanson advised that this crossing is considered suitable for haul route use 'as is' and no upgrades to the existing crossing or construction new crossings are proposed. The main site activities such as quarrying/mineral extraction, soil/overburden storage/restoration of oolite overburden will be sited in Flood Zone 1 and raised above the steep sided valley of Fordbury Water, and as mentioned above, all other associated ancillary activities will also be located in Flood Zone 1. On the basis that no works which could impact flood storage or conveyance are proposed within Flood Zone 2 and 3 areas of the Site, it is concluded that the fluvial flood risk to off-site receptors during the working phase will be unchanged relative to pre-working conditions.

Restoration Phase

3.3.7 The Westdown Quarry area is located entirely within Flood Zone 1 and will be restored with a lake. The ridge of high ground protecting the site from fluvial flooding from the Fordbury Water would be retained and occupancy of the site would be reduced. Part of Asham Wood Void area will be restored using overburden material (oolite) and inert quarry waste generated throughout the production process in Westdown Quarry. All soil/overburden storage and tipping within Asham Wood Void will occur entirely within Flood Zone 1 areas of the Site (**Figure 2.4**). Land levels in the areas of the Site within Flood Zones 2 and 3 would not be increased. On this basis the fluvial flood risk following restoration will be unchanged relative to current conditions.

3.4 Surface Water Flooding

Existing

3.4.1 The EA's online Flood Map for Surface Water gives an indication of the broad areas likely to be at risk of surface water flooding at present, i.e. areas where surface water would be expected to flow or pond. It defines areas at very low (less than 0.1% AEP), low (between 0.1% and 1% AEP), medium (between 1% and 3.3% AEP) and high (greater than 3.3% AEP) probability of surface water flooding. **Figure 3.1** shows that the majority of the Site is currently at a very low risk of flooding (0.1% AEP) from this source, however, some areas are shown to have low to high flood risk (0.1% to >3.3% AEP). These areas include topographic low areas to the north of Westdown Quarry (in an area of a proposed soil bund) and within the Asham Wood Void area.

3.4.2 Three existing surface water run-on flow pathways are indicated in **Figure 3.1**, as follows:

- The flow path of Fordbury Water;

[6] Modelled water levels were not provided by the Environment Agency, nor the elevation grid associated with the flood depth grid. On this basis, interpretation of the depth grid and extent against the elevation information held for the project was necessary to reach the conclusion of peak flood water levels not exceeding 136m AOD.

- A surface water flow pathway entering the Asham Wood Void part of the site from the south west (identified in the Restoration Plan in **Appendix D** as the Tunscombe Valley); and
- A surface water flow pathway along southern edge of Westdown Quarry near the A631 (which drains away from the proposed quarry).

3.4.3 A number of potential surface water flood risk receptors have been identified, as shown in **Figure 2.3**. These are:

- FRR1 Westdown Farm;
- FRR2 Site Infrastructure Operations (including the quarry and all other ancillary infrastructure);
- FRR3 Tongue Cottage and another dwelling south of A361;
- FRR4 Colemans Quarry Site Offices;
- FRR5 Valley Sawmills (Timber Commercial Buildings);
- FRR7 Domestic properties downstream of Stony Lane crossing;
- FRR8 Domestic properties upstream of Stony Lane crossing);
- FRR9 Domestic property along Railford bottom;
- FRR10 Hanson UK Site Offices and Whatley Quarry Infrastructure; and
- FRR11 Aggregate Industry Site Offices and Torr Quarry Infrastructure.

Working Phase

3.4.4 The quarrying operations will impact the ground levels at the site, both in terms of excavation to reduce ground elevations and the placement of material (stockpiles and restoration) to increase and/or change ground elevations. Such activities provide the potential to affect the surface water flood risks at the Site.

Surface Water Run-On

3.4.5 The flow path of the Fordbury Water is associated with a fluvial event and has thus been considered in the fluvial section above.

3.4.6 The surface water flow pathway entering the Asham Wood Void part of the site from the south west (Tunscombe Valley) would be impacted by placement of Oolite restoration material. The proposed ground levels in this area have been designed specifically to tie into the existing valley and as can be seen in the contours indicated in the Restoration Plan in Appendix D, a valley through which the surface water run-on could flow will be retained. The lack of potential receptors that could be at risk from this flow pathway suggests that, once the restored valley is 'greened up' no mitigation would be required to assist in conveying flows (consistent with the existing flow pathway). Temporary mitigation could be necessary during the construction phase to avoid sediment entrainment, whilst bare surfaces are exposed. Potential mitigation associated with this is discussed in **Section 4**.

3.4.7 The surface water flow pathway along southern edge of Westdown Quarry near the A361 drains away from the proposed quarry and would remain unaffected by the proposed works. As such, no risk to or from the Site is posed by this flow pathway and thus no mitigation measures are necessary.

3.4.8 The excavation of the quarry itself will affect surface water flows. Surface water run-on from upslope areas to the west and east of Westdown Quarry (approximately 11.2ha) will be contained in the excavation void and pumped into the attenuation/storage lagoons prior to discharge to Fordbury Water. Site discharge to Fordbury Water could potentially increase river flows and could result in increased flood risk to low-lying receptors downstream and adjacent to the receiving watercourse. A surface water management system will be designed for the site (detailed design to be developed subsequent to approval of the planning application) which should include management of surface water run-on, along with run-off sourced from within the Site. The capacity of the water management system is assessed in **Section 4**.

Surface Water Runoff

3.4.9 During the working phase, the development of bare/compacted land associated with mineral extraction, haul roads, overburden storage mounds, bunds and hardstanding infrastructure has the potential to increase the overall extent of lower permeability surfaces within the proposed development area. In the absence of effective surface water management measures, this could lead to a temporary increase in peak runoff rates and a consequent increase in flood risk for downstream receptors. Surface water management is discussed in **Section 4** below.

Restoration Phase

Surface Water Run-On

3.4.10 Surface water run-on into Westdown Quarry will be contained in a new restoration lagoon within the quarry. The capacity of the quarry void to also contain groundwater inflows such that uncontrolled spilling off-site and increasing flood risk to downslope receptors is prevented is assessed in **Section 4**.

3.4.11 Following restoration of part of Asham Wood Void, run on will continue to drain into Fordbury Water. The flow pathway entering the Asham Wood Void from the south west (Tunscombe Valley) will be able to continue through the site through the restored valley indicated in the Restoration Plan included in **Appendix D**. Therefore, it is considered that the restoration scheme would not be affected by surface water run on.

Surface Water Runoff

3.4.12 Increased surface water runoff from the restored areas of Asham Wood Void is expected due to steeper slopes, infilling of the former excavation void with lower permeability material as a result of reworking the stockpiled overburden/ soils, and compaction / lack of vegetation associated with newly restored land surfaces. If unmitigated this could lead to an increase in off-site surface water flood risk. Surface water management is discussed further in **Section 4**.

3.5 Groundwater flooding

3.5.1 Groundwater flooding occurs as a result of water issuing to the surface from the underlying aquifers. This tends to occur after long periods of sustained high rainfall, with the areas most at risk being situated on permeable geology which is low-lying compared to the local water table, and where no watercourse is available to drain the water away.

3.5.2 The Site is underlain by limestone strata (Principal Aquifer) with no or limited superficial deposits and relatively shallow groundwater levels in the winter (0.5 to 4 mbgl). Under baseline conditions

any emergence of rising groundwater is likely to be contained on Site and groundwater flooding on-site is unlikely to have any effect on distant potential flood risk receptors.

3.5.3 A number of potential groundwater water flood risk receptors have been identified (as per those listed for surface water flood risk), and as shown in **Figure 2.3**.

Working Phase

3.5.4 Due to the depth of the proposed excavations in Westdown Quarry (a minimum of 90m AOD is indicated, i.e. 65m below current ground level), groundwater ingress into the lower parts of the future void is expected during the working phase (groundwater modelling undertaken to support the ES indicates that the estimated rest groundwater level would be approximately 120m AOD). This would be contained in the excavation and when required, pumped into the attenuation/storage lagoons to provide dry working. It is normal for quarry operations to be subject to groundwater ingress and dewatering operations and thus it is anticipated that the operators of the quarry will be fully engaged with the dewatering process such that groundwater flooding would be managed and actively addressed/reacted to as necessary to ensure the risk to the site is dealt with appropriately.

3.5.5 Groundwater inflows, along with surface runoff and direct rainfall, would be contained in the excavation void and pumped into the Site's settlement/storage lagoons. Water in excess of the processing plant requirements is proposed to be discharged into Fordbury Water under conditions of a new Discharge Consent. The proposed water management system will need to be appropriately sized to accommodate both groundwater ingress and surface water. The capacity of the water management system is discussed in **Section 4**. On this basis (including the active management and interventions by the operator as necessary, as standard for deep quarrying operations), the risk of groundwater flooding in the working phase is considered to be low.

Restoration Phase

3.5.6 The proposed restoration works on the Asham Wood side of the site are not anticipated to have a significant effect on groundwater given the area is positioned above the water table and any emergence would continue to drain under gravity to the Fordbury Water.

3.5.7 Restoration of the Westdown Quarry with a lagoon with a base elevation of 90m AOD suggests that groundwater will enter the lower parts of the quarry and equilibrate at the anticipated rest mean groundwater level of 120m AOD, which is approximately 15 to 35m below ground levels (rest groundwater level discussed in **Section 2.5**). The capacity of the quarry void to also contain surface water run-on such that uncontrolled spilling of flood water off-site and increasing flood risk to downslope receptors is prevented as assessed in **Section 4**. The risk of groundwater flooding of the restored lake and immediate surrounds could increase if there was no dewatering in the surrounding area, e.g. once dewatering of the Torr Works Quarry located to the south west of the site ceases (assuming no other/new quarries commenced in the meantime), but groundwater modelling undertaken to support the ES indicate that peak water levels would remain within the wider quarry void (peak groundwater levels estimated up to approximately 134-135m AOD). If groundwater levels (and thus lake levels) continued to rise (which itself may not be feasible based on the initial groundwater modelling undertaken to support this application), the proposed restoration plan (**Appendix D**) indicates that water would remain within the wider quarry void to an elevation of 139m AOD, at which point water would begin to spill to the north (139 m AOD), towards the Fordbury Water, thus ensuring that the groundwater is drained away by a watercourse rather than towards other third party receptors.

3.5.8 Along the south eastern corner of the restored Westdown Quarry, the elevations are indicated to be higher (between 140m AOD – 145m AOD) therefore it is likely that any increase in groundwater levels will be contained and spills would not take place on that side of the Site.

3.5.9 At this stage based on current estimates it is not anticipated that any additional flood risk management measures (**Section 5**) would be necessary to address groundwater flood risks. At the detailed design stage this will be checked and validated prior to the onset of works. In the unlikely event that there was a risk of groundwater flooding identified it may be necessary to reconsider whether a formal overspill channel at the spill location is necessary to direct lagoon water safely to Fordbury Water.

3.6 Sewer Flood Risk

3.6.1 The Site is situated away from developed areas and it is anticipated that there are few sewer drainage networks in the vicinity of the Site. Any flows from surcharging from minor sewer systems associated with nearby farm buildings would be expected to be minimal/intercepted by the local watercourses. On this basis, the risk of sewer flooding in the area is considered to be low.

3.7 Artificial Flood Risk

3.7.1 There are no artificial sources (such as reservoirs and canals) of flood risk in the vicinity of the Site. The EA's Flood Risk from Reservoirs Mapping (EA, 2020) shows that the Site is not within a flood risk area. No raised bodies of water are proposed as part of the development.

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N

Shearmoor Wood
Shearmoor Stream
Castlehill Wood
Green Farm
Bangle Farm
Beaucombe Coppice
Asham Wood
Lodge Hill Manor
Asham Wood Void
Westdown Quarry
1 - 5
2 - 5
3 - 5
4 - 5
5
Westdown Farm
Howell
Cottage
Clifford
Broadgrove House
Fordbury Water / Whatley Brook

Key

- Westdown consolidating planning submission area
- Watercourse
- Water body
- Westdown Quarry area (including mineral extraction phase)
- Indicative sump location
- Indicative discharge point
- Haul road
- Soil storage bund
- Asham Wood restoration area
- Oolite storage
- > 3.33% AEP - High risk of surface water flooding
- 1% - 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding
- < 0.1% AEP - Low risk of surface water flooding

0 200 400 600 m

Scale at A3: 1:10,000

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Westdown Quarry Consolidating Planning Submission
Flood Risk Assessment

Figure 3.1
Environment Agency surface water flood risk map

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wood.

4. Surface Water Management

4.1 Introduction

4.1.1 The creation of bare/compacted land associated with mineral extraction, haul roads, overburden storage mounds, bunds and hardstanding and restoration operations at the Site has the potential to increase surface water run-off rates, volumes and pathways. Appropriate management of surface water will therefore be necessary to ensure risks to on-site and off-site (down-gradient) third party receptors are appropriately addressed.

4.1.2 A water management system will be designed for the site to address surface water run-off (surface water originating from within the site); surface water run-on (surface water originating from outside of the site); and groundwater ingress (which it is anticipated will be dealt with alongside surface water). The detailed design of this system is to be developed subsequent to approval of the planning application.

4.1.3 For this Flood Risk Assessment, the focus is on ensuring that sufficient space has been set aside (in the various phasing plans) such that the delivery of such water management measures (once designed in detail) can be achieved on-site. As such, the focus is on attenuation requirements, which can require significant land take. It is anticipated that a number of smaller measures would be required to achieve an overall strategy, but that these would be identified, determined and incorporated at the detailed design stage without any requirement for redesign of the overall quarry phasing. For this application, indicative locations for settlement and attenuation drainage infrastructure (those SuDS with larger footprints) have been identified in the phasing plans (included in **Appendix D**), accompanied with assurance from Hanson that there is sufficient space available on-site in which to provide the necessary drainage measures, as discussed further below.

4.1.4 This section also provides a review of the SuDS legislation and guidance that provide the context for the attenuation requirements.

4.2 SuDS - Legislation and Guidance

National Planning Policy Framework

4.2.1 The NPPF requires that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development (unless specific off-site arrangements are made and result in the same net effect). Typically, run-off volumes generated during a storm will have to be stored for the duration of the storm and infiltrated to ground or released slowly afterwards to meet the required discharge rate.

4.2.2 The NPPF further advises that planning authorities should promote the use of Sustainable Drainage System (SuDS) principles in the management of surface-water run-off from new developments. There is a presumption for the use of SuDS within any development, except in rare instances that it can be demonstrated that SuDS principles cannot be feasibly be incorporated within a development, as agreed with the planning authority.

Floods and Water Management Act

4.2.3 Under the Floods and Water Management Act 2010, SCC are designated as the LLFA and therefore are a statutory consultee on major planning applications in relation to surface water drainage.

CIRIA SuDS Manual (C753)

4.2.4 The CIRIA SuDS (C753) is the most up-to-date industry standard containing revised principles and technical advice for the planning, design, construction, management and maintenance of effective SuDS. As the LLFA, SCC expect all new or existing developments be designed to align with the revised (C753) manual.

DEFRA Non-statutory technical standards for sustainable drainage systems, 2015

4.2.5 The Non-statutory technical standards for sustainable drainage systems is a national guidance document that provides a set of standards to be applied when designing SuDS systems for any development. Standards include controls on peak flow and volume of run-off and flood risk internal to the development and downstream. These are the flow standards to which SCC are likely to judge any proposed surface water management system.

Lead Local Flood Authority Advice

4.2.6 The 2011 SCC Minerals and Waste Development Framework SFRA states that runoff and/or discharge rates from mineral sites should be restricted to greenfield runoff rates. SCC contributed towards the West of England Sustainable Drainage Developer Guide (SCC, 2015) which provides further SuDS guidance and reiterates the NPPF in stating that major developments are expected to ensure that SuDS are put in place, unless demonstrated to be inappropriate.

4.2.7 The LLFA consultation (**Appendix A**) included some general SuDS requirements for the Site. The requirements are presented in **Section 6** where the compliance of the proposed measures is confirmed.

4.3 Calculation Runoff and Required Attenuation Volume

4.3.1 The following section summarises the estimates the runoff attenuation requirements in the working and restoration phases of the Site as discussed in **Appendix E**, so that surface water runoff rates are attenuated to greenfield rates.

Working Phase

Proposed Water Management System

4.3.2 The development of the Asham Wood side of the site is progressing towards the restoration phase end state and therefore the water management system for this part of the site is dealt with under the restoration phase section below.

4.3.3 The proposed water management system for the Westdown Quarry side of the Site during the working phase is described below

i. Surface water and groundwater entering the excavation in Westdown Quarry will be pumped from the base of the workings into a sump and then onto the main quarry settlement/attenuation lagoon system located outside of the excavation itself. This will be located directly north of the Phase 1 working area, on the flat platform between the working area and the river (but on the quarry side of the ridge of high ground separating the two). The indicative location is shown in Phasing Plans 1 to 5 in **Appendix D**. The benefit of this location is that the lagoon can remain there throughout all phases and it ideally placed between the working area and the proposed discharge point to the river. Being located on the quarry side of the ridge of high ground means that it would be protected from flooding from the Fordbury

Water. The current estimated groundwater dewatering rate ranges over time from a minimum of 0.3Ml/day during Phase 1 to 15.9Ml/day during Phase 5 (as indicated in ES Appendix 10A: Hydrogeological Modelling Report);

ii. Following settlement of sediment, the water will then be pumped (via a pipeline with a turbidity meter) from the settlement/attenuation lagoon system into Whatley Brook/ Fordbury Water under discharge consent. The discharge location has not yet been fixed, but an indicative location is indicated in **Figures 2.3**, **2.4** and **3.1**;

iii. The weighbridge, offices, wheelwash and vehicle parking area in the north eastern section of the site would also be served by a SuDS attenuation and settlement system (indicated in Phasing Plans 1 to 5 in **Appendix D**), with flows also channelled through an oil interceptor prior to discharge to Fordbury Water;

iv. Runoff from impermeable areas associated with the Site processing plant will be directed to catchment pits to collect and treat runoff prior to discharge into the Fordbury Water; and

v. The haul roads/trafficked areas would be profiled to direct all runoff to catchment pits to collect and treat runoff prior to discharge into the Fordbury Water. For the section of haul road crossing the Forbury Water, it is anticipated that some flows could not be conveyed out of the valley for treatment and attenuation outside and the floodplain. Therefore at least some drainage measures will need to be located in the floodplain to serve the run-off from the road in the valley. An indicative location for this has been identified, as indicated in Phasing Plans 1 to 5 in **Appendix D**.

vi. In the instance of heavy rainfall beyond the capacity of the pump in the quarry excavation and/or beyond the capacity of the main quarry settlement/attenuation lagoon, the excavation itself would be allowed to flood and simply dewatered again once the rainfall event had passed. The benefit of this approach is that the rainfall into the quarry void would drain by gravity (with no reliance on the pump to keep up with the rainfall). It also avoids the need to provide excessive (potentially impounded) attenuation storage volume either within the main quarry settlement and attenuation lagoon (located outside of the quarry void to the north), nor in a dedicated attenuation structure in the quarry void itself. The risk of flooding within the void would be actively monitored and managed by the quarry operators/manager, and the Emergency Flood Response Plan enacted to evacuate the quarry void itself if necessary.

Attenuation storage calculations – working phase

4.3.4 WinDES MicroDrainage software has been used to appropriately size the required storage during the working phase so that the runoff rate is maintained at the greenfield rate QBAR up to and including the 1% AEP extreme rainfall event plus 40% climate change and there is no uncontrolled spilling off-site. A 40% climate change (CC) allowance has been used as advised by the SCC as the LLFA during a call on 5th November 2020.

4.3.5 The following assumptions have been applied during the WinDES MicroDrainage modelling:

- The total worked area is 37.6ha and total upslope area is 11.1ha comprising of 5.2ha within the Fordbury Water catchment and 5.9ha Nunney Brook catchment;
- The proposed Site lifespan would be to 2042. A CC allowance of 40% is considered, based on the advice of SCC as the LLFA;
- Working areas assumed to be 100% impermeable with a Cv (Volumetric Coefficient) assumed at 0.78 for both summer and winter. Given the compaction/fines from workings, the impermeable assumption is considered appropriate for the surface type.

The Cv of 0.78 represents runoff only occurring from approximately 78% of the area to allow for runoff infiltration/capture/stored within the workings;

- The required attenuation volumes for the Site would be provided within the Westdown Quarry excavation and on-site settlement/attenuation lagoons; and
- Attenuation volumes assume interception of total runoff by the time the final phase (Phase 5) is reached. Due to the phased working/restoration, runoff during earlier phases would be less. Attenuation requirements for individual phases can be sized by a pro-rata comparison of the area of each phase with the area of the entire excavation area, thereby allowing flexibility in future phasing.

4.3.6 The results are summarised in **Table 4.1** and provided in full in **Appendix E**. This indicates that the maximum attenuation volume (i.e. Phase 5) for the 1% AEP plus 40% CC event is approximately 58,191m^3 for the Westdown Quarry. This volume represents the worst-case (conservative) scenario as it assumes interception of total runoff which relates to the maximum extent of working, i.e. Phase 5. As can be seen in **Table 4.1**, reduced volumes are required during earlier phases. These volumes will be provided in a number of areas, as indicated in the Phasing Plans included in **Appendix D**. The main volume will be split between the main quarry settlement and attenuation lagoon (located immediately outside and to the north of the Phase 1 quarry void), with the remainder (during the heaviest, largest events) simply provided in the quarry void itself. Therefore this will ensure that all attenuation requirements can be provided, without requiring excessive (potentially impounded) attenuation structures to be provided at the main settlement and attenuation lagoon.

Table 4.1 Attenuation Requirements during Working Phase

Phase	Total Runoff Area (ha)	Maximum Allowable 1% AEP Discharge Rate (l/s)	Half Drain Time (Hrs)	Critical Duration (mins)	Attenuation Storage Volume at 1% AEP + 40% CC (m^3)
Phase 1	21.1	46.2	53.6	2880W	17,918
Phase 2	31.3	68.4	54.8	2880W	28,982
Phase 3	45.7	99.7	61.8	2880W	45,078
Phase 4	48.5	105.9	63.2	2880W	48,046
Phase 5	57.1	124.6	60.7	2880	58,191

Restoration Phase

Proposed Water Management System

4.3.7 The proposed water management system for the Site during the restoration phase is described below:

- Surface water and groundwater entering Westdown Quarry will be contained within the quarry void forming a restoration lagoon; and
- Surface water runoff from the restored areas of Asham Wood Void will drain to settlement/attenuation pits prior to discharge to the Fordbury Water.

4.3.8 Attenuation storage calculations – working phase Windes MicroDrainage software has been used to appropriately size attenuation structures during the restoration phase so that the runoff rate is maintained at the greenfield rate. The following assumptions have been applied during the modelling:

- Westdown Quarry: It is anticipated that run-on into the quarry void plus upslope areas will be intercepted by the proposed restoration lagoon. The lagoon area has been considered to be fully impermeable (i.e. Cv of 1.0) for the purposes of this calculation; and
- Asham Wood Void: Increased surface water runoff from the restored areas is expected due to steeper slopes, infilling of excavation void with lower permeability material as a result of reworking of the stockpiled overburden/soils, and compaction/lack of vegetation associated with newly restored land surfaces. Greenfield runoff from restored areas have been estimated using unit hydrographs with an increase in the soil classification (SPRHOST increased from 13.05 in the baseline scenario to 37.08 in restoration scenario) to represent a more impermeable surface in the restored areas. It is anticipated that a small 'attenuation catchment pit' will be required to accommodate the increased run-off associated with these lower permeability restored areas. Indicative locations, located outside of the Flood Zones are indicated in the Phasing and Restoration Plans included in **Appendix D**. It has been necessary to make an assumption regarding the scale of this catchment pit in order for direct rainfall to be accounted for in the attenuation calculations. This has nominally been set to 1 ha as an approximation and has been considered to be fully impermeable (i.e. Cv of 1.0) for the purposes of this calculation.

4.3.9 The attenuation requirements for the restoration phase are provided in **Table 4.2** and provided in full in **Appendix E**. This indicates that the attenuation volume at 1% plus 40% CC for the Westdown Quarry is approximately 86,766m^3 (0.5m depth of flood water), and outside of Flood Zones 2 and 3. Runoff from the restored areas of Asham Wood Void will require an attenuation volume of 6,116m^3, which would be provided on the lower slopes of Asham Wood Void and outside of the Flood Zones 2 and 3.

Table 4.2 Attenuation requirements during Restoration Phase

Catchment	Total Runoff Area (ha)	Lagoon Area (ha)	Restored Area (ha)	Half Drain Time (Hrs)	Maximum Allowable Discharge & QBAR (l/s)	Critical Duration	Baseline Attenuation Volume	Restored Attenuation Storage Volume At 1% AEP + 40% CC (m^3)[b]	Additional Volume to be accommodated (m^3)[c]
Westdown Quarry									
Restoration Phase	73.6	27.7	34.8	19.37	160.4	>10080	0[a]	86,766	86,766
Asham Void									
Restoration Phase	11.4	1.0	10.4	50.83	24.9	2880	3,639	9,756	6,116

Notes:
a: Due to the change in the drainage regime, all baseline flows will need to be accommodated in the proposed restoration lagoon.
b: Both baseline and restored attenuation volumes have been subjected to a subsequent storm check
c: Restoration Attenuation Storage Vol = Restored Attenuation Vol - Baseline Attenuation Vol

4.4 Considerations for Drainage Design

4.4.1 The above sections have identified the attenuation requirements in the working and restoration phases of the Site. As noted there will be a number of measures required to deliver an overall water management system, which will be identified, determined and incorporated at the detailed design stage without any requirement for redesign of the overall quarry phasing. Below **Table 4.3** outlines the key considerations which would be taken into account as part of the drainage design in relation to activities.

Table 4.3 Considerations for Detailed Design

Activities	Consideration for Drainage Design
Working Phase Activities	
Westdown Quarry once a void has been excavated	Appropriate consideration of drainage routes would be given to ensure all runoff flows are captured by the Site water management system and routed to the excavation void and settlement/storage lagoons.
Site Compound (including welfare facilities and mineral processing plant)	Areas that are used for fuel storage and plant operation, and refuelling which will be surfaced with fully impermeable materials to prevent any infiltration of contaminated runoff. Any bunding associated with the compound would allow for appropriate pipes at low points to preserve natural flow paths. The drainage from the compound will be designed in accordance with SuDS principles and pre-development rates in accordance with the West of England SuDS guidance. Details will be provided within a detailed drainage strategy at the detailed design stage prior to construction.
Maintenance of SuDS including silt management	Hanson would maintain the on-site settlement/storage lagoons SuDS and undertake silt management for the operational lifetime of the relevant element of quarry operations. Should the existing settlement lagoons have insufficient capacity, an additional silt storage lagoon can be placed.
Watercourse crossing of the Fordbury Water	This crossing has been assessed by Hanson as suitable for haul route use and no upgrades to the existing crossing or construction new crossings are proposed, In the event of this position changing any crossing works within 8 m of an Ordinary Watercourse (Fordbury Water) would be subject to consent from SCC.
Restoration Phase Activities	
Restored areas of Asham Wood Void	Careful management of stockpiled soils and overburden (e.g. no degradation in soil properties) and the incorporation of appropriate drainage features such as swales within the restored Asham Wood void to capture run on flow pathways and to divert it around stockpiles to the Fordbury Water. Temporary measures to control erosion/sediment entrainment/sediment-laden flows may be necessary during the restoration phase, prior to 'greening up' of stockpiles/placed material. Consideration of long term erosion controls will also be identified if necessary. The detailed design sizing and siting of such features will be secured as part of a planning condition, to ensure that this is implemented as part of the restoration phase works.
Restoration lagoon at Westdown Quarry	Appropriate consideration of drainage routes would be given to ensure all runoff flows are captured by the Site water management system and routed to the restoration lagoon.

5. Flood Risk Management

5.1 Flood Risk Management Measures

5.1.1 Based on the assessment undertaken in **Section 3**, the main flood mechanisms at the Site were identified to be from surface water, and groundwater flooding during working and restoration phases and fluvial flood risk to site workers using haul roads/access roads crossing Flood Zones 2 and 3 to move material between the Westdown Quarry and Asham Wood parts of the site. The other potential risks from fluvial sources were assessed to be acceptable on the basis of avoidance of works within the floodplain that could result in a loss of floodplain storage and the proposed approach to retain a ridge of high ground between the Fordbury Water and the Westdown Quarry to ensure the quarry itself is not at risk of flooding from the Fordbury Water.

5.1.2 This section outlines key flood risk management measures to ensure the Site is safe from flooding, and flood risk is not increased to off site receptors for both the working and restoration phases.

Avoidance of Flood Zone 2 and 3

5.1.3 As noted earlier it has been confirmed by Hanson that there will be no mineral extraction, soil/overburden storage, ground raising, or attenuation basins/lagoons proposed in areas of Flood Zones 2 or 3 as indicated within in **Figure 2.4**. The only parts of the site located in Flood Zones 2 and 3 during the working and restoration phases comprise of access roads that link the Westdown Quarry and Asham Wood parts of the Site.

Emergency Flood Response Plan

5.1.4 Site workers undertaking activities in these areas of Flood Zone 2 and 3 would be at risk during a flood event and thus it is recommended that an Emergency Flood Response Plan is prepared, and all site workers briefed as necessary as part of their site induction. This could involve signing up to receive flood alerts and warnings from the Environment Agency and/or regional alerts from the Met Office. Actions could involve placing operations on hold until such time as the risk at the site itself has been considered further and escalating to ceasing operations if deemed necessary. Additional measures could include ensuring any sensitive equipment/vehicles are not parked in areas at risk and even ensuring workers are given sufficient notice to travel home if travel across areas at risk of flooding is predicted.

5.1.5 The Emergency Flood Response Plan would also separately cover the risk to workers and equipment within the quarry void itself in the event of heavy rainfall that could result in surface water run-off ponding in the base of the void. Given that it is associated with rainfall, a flood warning from the Environment Agency relating to the Forbury Water would not necessarily apply to such an event. Instead Met Office weather warnings for rain would provide a better indicator of potential flood risk.

5.1.6 The Emergency Flood Response Plan would be developed by the site operator prior to mineral extraction recommencing at the site and would remain a live document for the duration of workings to ensure it remains appropriate for the phase of work being undertaken and up-to-date with the latest alert/warnings services and guidance.

5.1.7 The plan would only be required during working and restoration phases, once restored and vacated, no plan would be necessary.

Lake water level management structure for restored lagoon at Westdown Quarry

5.1.8 As noted in **Section 3.5**, rest water levels in the restored lagoon at Westdown Quarry are anticipated to be 120m AOD, on the basis that dewatering of the surrounding area is anticipated to continue into the long term owing to the long term viability of ongoing and new quarry operations in the wider area. However, to ensure groundwater (and thus lagoon/lake) water levels are managed in the unlikely scenario that all dewatering operations in the surrounding area cease, it is proposed that the ongoing consideration of lake water level management structures are included in regular ongoing groundwater level monitoring studies (yearly reports) and periodic reviews. As set out in **Section 3.5** groundwater modelling indicates that post-restoration peak groundwater levels (reflected in the restoration lake water levels) would still remain with the wider quarry void (which is to remain inaccessible to the general public following restoration) irrespective of wider dewatering operations. Furthermore, restoration ground elevations indicate that if groundwater levels were to rise further than currently modelled, the eventual spill would be to the north towards the Fordbury Water watercourse, rather than any off-site third party receptors (such as to the south east). On this basis, no further flood risk management measures are considered necessary to address groundwater flood risks at this time. However the need for a formal structure to manage lake water levels, (whether that be a spill structure and a channel to safely convey any excess flows to the river or something else) will be reviewed as part of the annual monitoring and periodic reviews process. The Minerals Products Association's Restoration Guarantee Fund (of which Hanson is a member) will provide the mechanism by which future intervention would be funded post-restoration, if necessary.

Detailed drainage design

5.1.9 As noted in **Section 4** a water management system will be designed for the site to address surface water run-off, run-on and groundwater ingress. The information provided in **Section 4** and **Appendix E** has be set out to ensure that sufficient space has been set aside in the various phasing plans such that the delivery of such water management measures once designed in detail can be achieved on-site. The detailed design of this system is to be developed and refined subsequent to approval of the planning application.

6. Compliance with requirements of the LLFA

6.1.1 **Table 6.** details the key consultation responses from SCC as the LLFA for the proposed development (**Appendix A**). These are the requirements SCC specified for a full planning application. The table then outlines the method through which the proposed design of the Site would comply with each requirement.

Table 6.1 LLFA requirements and site compliance

LLFA comment reference	LLFA requirements from consultation response (see Appendix A)*	Site compliance with LLFA requirement
1	Flood risk assessment and drainage strategy, which should detail any flood concern and how they will be overcome and show the proposed method of dealing with surface water with supporting information and calculations.	This flood risk assessment covered all potential sources of flooding and includes assessment of surface water run-on and run-off in **Section 3.4**, Surface Water Management in **Section 4** and calculations in **Appendix E**. Flood risk management measures to address all potential flood risks identified are covered in **Section 5**. WinDES MicroDrainage software has been used to inform the Site's surface water management during the working and restoration phase and to appropriately size the required attenuation storage so that the runoff rate is maintained at the greenfield rate up to and including the 1% AEP extreme rainfall event plus 40% climate change and there is no uncontrolled spilling off-site.
2	Drawing and report illustrating the proposed surface water drainage system including location of SuDS features, manholes, external pipework, attenuation features, pumping stations (if required) and discharge locations	The phasing plans provided in **Appendix D** provide indicative locations for settlement and attenuation drainage infrastructure (such as the main quarry settlement and attenuation lagoon). The indicative locations of these 'larger' scale SuDS have been provided to demonstrate that space has been set aside in suitable locations to enable gravity drainage outside of the floodplain. Smaller scale elements (such as pipework and or conveyance channels) will be determined subsequently at detailed design stage. **Figures 2.2**, **2.3** and **2.4** include the indicative location for the proposed discharge point to the Fordbury Water.
3	Site constraints, and flooding issues onsite and downstream have been considered, and ensure that to ensure that as a minimum the proposed development does not exacerbate the problem. Natural flow paths for water of the site considered.	A flood risk assessment has been carried out for all potential flood constraint including in **Section 3**, and appropriate flood risk mitigation measures have been set out in **Section 4** and **Section 5** to ensure that the proposals will not increase levels of flood risk towards the development or elsewhere.
4	Demonstration that the SuDS hierarchy has been considered in accordance with NPPF and justification for the proposed method of surface water discharge and demonstration that best practice SuDS have been promoted, appropriate to the size and nature of development	A sustainable approach to drainage is proposed, whereby water is captured and managed on-site, managed at the surface wherever possible, attenuated to greenfield rates, treated as necessary and discharged to surface watercourse. **Section 4** and **Appendix E** outlines the proposed surface water management for the Site and sets out the relevant SuDS legislation and good practice guidance which have been taken into account at this outline design stage. Details of specific SuDS to deliver the proposed approach will be provided at the detailed design stage.

LLFA comment reference	LLFA requirements from consultation response (see Appendix A)*	Site compliance with LLFA requirement
5	If pumped systems are proposed, justification for the use of these systems, summary of key design principles and assessment of residual risk. However, we strongly resist the use of these systems	Pumping of the quarry excavation will be necessary due to excavation below ground level, the water table and excavation below the nearby watercourse which provides the discharge location. This is normal for deep quarry operations and such active intervention for drainage will be actively managed during operation of the quarry. Once restored, no further pumping would be necessary. Surface water and groundwater entering the excavation in Westdown Quarry will be pumped from the base of the workings into a sump and associated settlement/attenuation lagoon system (to be located to the north of the quarry). Following settlement, the water will then be pumped (via a pipeline with a turbidity meter) from the settlement/attenuation lagoon system into Fordbury Water under discharge consent. In the event of pump failure, run-off would be contained within (and/or flow back to) the quarry void itself.
6	Drawing to illustrate that attenuation structures are not located within an area at risk of fluvial or surface water flooding up to the 1 in 100+ climate change annual probability event, and rational behind this if this is the case.	The indicative settlement and attenuation areas are located entirely within Flood Zone 1, other than the one proposed to manage rainfall already falling on the section of the haul road within the Fordbury Water valley (for which pumping would be required to return it to Flood Zone 1). Refer to **Figure 2.4** of the FRA and the Phasing and Restoration Plans included in **Appendix D**.
7	Drainage strategies should mimic existing drainage conditions as far as reasonably practical. Depending on location discharge rates should be limited to either pre-development (greenfield) conditions or restricted further, depending on IDB/Wessex Water/EA requirements.	The approach to drainage set out in this report limits discharge to Q_{BAR} greenfield rates, for all events up to and including the 1% AEP extreme rainfall event plus 40% climate change event. WinDES MicroDrainage software has been used to appropriately size the required attenuation storage for both working and restoration phases so that the runoff rate is maintained at the greenfield rate and there is no uncontrolled spilling off-site. These calculations are provided in **Section 4** and **Appendix E**. The Site is not within an IDB district, and the EA have not provided comments to the Scoping Report at pre-application stage including any requirements on discharge rates.
8	Calculations to demonstrate that the proposed surface water drainage system has been designed to prevent surcharging in all events up to an including the 1 in 2 annual probability storm event, prevent any flooding of the site in all events up to and including the 1 in 30 annual probability storm event, and demonstrate that surface water runoff up to the 1 in 100 year event plus climate change will be controlled without causing harm to people or properties.	For this planning application submission, calculations have been provided to demonstrate that surface water runoff can be adequately stored and attenuated to the greenfield runoff rate for the 1 in 100 year event plus climate change during the working and restoration phases, without increasing flood risk downstream. As noted in **Appendix E** the new drainage infrastructure proposed on the Site to manage the runoff to and from the attenuation lagoons will be designed (at the detailed design stage) to prevent surcharging in all events up to an including the 1 in 2 year storm event. In addition, drainage will be designed to prevent flooding of the site in all events up to and including the 1 in 30 year storm event, and that all surface water runoff up to the 1 in 100 year event plus 40% climate change will be controlled and retained within the Site without causing harm to people or properties.

LLFA comment reference	LLFA requirements from consultation response (see Appendix A)*	Site compliance with LLFA requirement
9	Assessment of attenuation volume needed with supporting calculations and methods.	The supporting calculations and methods are provided in **Appendix E** and the assessment is summarised in **Section 4**.
10	Demonstration that a viable connection can be made for discharge offsite. For connection to watercourse demonstrate that system can function under surcharged/ flood conditions including calculations that demonstrate that the half-drain time of any storage structures is less than 24 hours.	The proposed discharge point is to the Fordbury Water, adjacent to the existing crossing, which is within the extents of the Site boundary **Figure 2.1**. **Appendix E** demonstrates that there is sufficient storage to retain a 100yr (40%CC) critical event, plus a 10yr critical event which occurs after only 24hrs of drain down. This is standard industrial check for attenuation when drain down is less than 24hrs. https://www.susdrain.org/files/resources/fact_sheets/03_14_fact_sheet_attenuation.pdf As noted in **Appendix E** the requirement for demonstration that system can function under surcharge will be adhered during the detailed design stage. In any case, in the event that the system could not drain for a time, the low lying areas of the site (e.g. the quarry void) site would be resilient to temporary flooding.
11	Where it is proposed to discharge to a drainage system maintained/operated by other authorities (Environment Agency, internal drainage board, highway authority, sewerage undertaker, or Canals and River Trust), evidence of consultation and the acceptability of any discharge to their system should be presented for consideration.	Discharge to the Fordbury Water watercourse (an Ordinary Watercourse) is proposed. As noted in Comment 7 at the pre application stage the EA did not provide any feedback in response to the scoping report. It is proposed to consult further with the EA at the next stage of formal consultation following planning application submission.
12	Confirmation of the proposed methods of treating surface water runoff to ensure no risk of pollution is introduced to groundwater or watercourses both locally and downstream of the site, especially from proposed parking and vehicular areas	On-site activities during both quarrying and restoration do not present many opportunities for pollution to occur, however a number of pollution prevention and accident response procedures are proposed in **ES Chapter 10: Water Environment**. A sustainable approach to drainage is proposed, including settlement prior to discharge. Hanson also operate an externally accredited ISO14001 Management System. Relevant procedures include UKCP04 Oil Liquid Fuel and Chemical Storage, UKCP05. Environmental Aspect and Impact Assessment, UKCP09 Emergency Response, UKSP010 Monitoring and Measurement of Product and Service including suitable equipment. Pollution prevention measures are summarised below. The site induction for contractors would also include a specific session on good practice to control water pollution from construction activities. Contractors would be made aware of their statutory responsibility not to "cause or knowingly permit" water pollution. The requirements for mitigating effects of dust and vehicle movements necessitate the dampening down of areas potentially producing dust and the provision of wheel washing facilities. Areas where these activities occur would

LLFA comment reference	LLFA requirements from consultation response (see Appendix A)*	Site compliance with LLFA requirement
		provide sustainable drainage measures for sediment-entrained run-off, such as silt traps. To mitigate against accidental spillages, all chemical storage areas would be within areas of hardstanding, would be bunded so that 110% of the stored capacity is provided, and would be located at least 50 m away from any surface watercourses, drains and settlement ponds, and outside the base of the quarry. Plant and machinery used during the quarrying would be well maintained to minimise the risks of oil leaks or similar. Maintenance and refuelling of machinery would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath plant and machinery during refuelling and maintenance would contain small spillages. Throughout the working phase best working practices would be adopted and measures to protect the water environment would be taken by adopting recommendations set out in the EA/'s discontinued (but still relevant) PPG Notes. Pumped water from the excavation in excess of the mineral processing water demand would be discharged into Fordbury Water after settlement of suspended solids in the Site's settlement/storage lagoons,
13	If access or works to third party land is required, details of these works and agreement in principal with necessary landowners/consenting authorities to cross third party land and/or make a connection to the proposed watercourse/sewer	Not required for the proposed development.
14	Consideration of maintenance and operation of the system for the lifetime of the development and access to the system	Hanson's quarry manager would be responsible for maintaining the incorporated surface water management features (as detailed in **Section 4**) for the operational lifetime of the relevant element of quarry operations. A restoration aftercare scheme would also be agreed by way of planning condition.

7. Conclusions

7.1.1 This FRA accompanies the ES submission for the proposed recommencement of mineral extraction at Westdown Quarry.

7.1.2 The Site is not at risk of tidal flooding, sewer flooding or flooding from artificial sources. With regards to fluvial flooding, the majority of the Site, including all working areas and soil stockpiling, is situated in Flood Zone 1 and would remain so for the lifetime of the development. Only a small area of the Site is situated in Flood Zones 2 and 3 associated with Fordbury Water watercourse where no extraction or soil/overburden stockpiling or tipping are proposed. A sequential approach to the site layout has been undertaken whereby the only activities anticipated to occur in Flood Zones 2 and 3 would be use of the haul/access road to move material between the Westdown Quarry and Asham Wood sides of the site. An Emergency Flood Response Plan would be prepared by the site operator to address the flood risk posed to site workers in this area. Provided these measures are put in place (along with the avoidance of any ground raising in Flood Zones 2 or 3), it is concluded that flood risks to and from the site would be acceptable, with no increase in fluvial flood risk to off-site third party receptors, and the risk on-site managed appropriately. The NPPF Sequential Test is considered to be passed on the basis set out in **Section 2.6** of this report.

7.1.3 Surface water would be managed to address surface water run-off, as well as surface water run-on. It is anticipated that the proposed system would also be used to deal with dewatered groundwater from the quarry void. For this application submission, an outline approach to drainage has been identified, including identification of the discharge location (Fordbury Water), discharge rates (greenfield Q_{BAR}), attenuation volumes (up to and including the 1% AEP plus 40% climate change event). Attenuation features would be located outside of Flood Zones 2 and 3, and run-on flow pathways would be accounted for, allowing flow through the site as necessary, with the need and scale of such measures to be determined at the detailed design stage.

7.1.4 Detailed design of the surface water drainage system would be undertaken subsequent to planning permission being granted, by way of planning condition discharge. Reconsideration of the attenuation requirements may be appropriate to enable refinement of the design measures.

7.1.5 On the basis of the groundwater modelling undertaken to support the ES, and the ground elevations indicated in the proposed restoration plan, no further flood risk management measures are considered necessary to address groundwater flood risks. The need for a formal spill structure for the location in which groundwater would spill to the north (if lake levels ever reached that elevation) will be reviewed during the operational phases if groundwater level monitoring and updated groundwater modelling indicates that post-restoration groundwater levels could reach the spill elevation sufficiently frequently that a formal spill structure would be necessary.

7.1.6 The Proposed Development, with the flood risk management measures described above in place, would not be subject to an unacceptable level of flood risk, nor would it increase flood risk elsewhere.

8. References

British Geology Society (2020) Geoindex Onshore Viewer for 1:50000 Bedrock and Superficial Geology, and Borehole Logs (Online) Available from https://mapapps2.bgs.ac.uk/geoindex/home.html

CIRIA (2015) The SuDS Manual (C753)

Cranfield University (2020) Cranfield Soil and Agrifood Institute Soilscapes Website (Online) Available from http://www.landis.org.uk/soilscapes

DEFRA (2015) Non-statutory technical standards for sustainable drainage system

Defra (2020) Magic Map Website (Online) Available from https://magic.defra.gov.uk/magicmap.aspx

Environment Agency (2012) Bristol Avon Catchment Flood Management Plan https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/294182/Bristol_Avon_Catchment_Flood_Management_Plan.pdf, June 2012

Environment Agency (2020) Main Rivers Map (Online) Available from https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386

Environment Agency Flood Map for Planning Service (2020) https://flood-warning-information.service.gov.uk/long-term-flood-risk/map (accessed 18/08/2020)

JBA (2020) Mendip District Council Strategic Flood Risk Assessment https://www.mendip.gov.uk/article/9110/Strategic-Flood-Risk-Assessment, March 2020

National Planning Policy Framework (NPPF) (2019)

NPPF Flood Risk and Climate Change Planning Practice Guidance (2019), https://flood-map-for-planning.service.gov.uk (accessed 18/08/2020)

Somerset County Council (2011) Preliminary Flood Risk Assessment Report, https://www.somerset.gov.uk/waste-planning-and-land/flood-and-water-management/, June 2011

Somerset County Council (2011) Minerals and Waste Development Framework, Strategic Flood Risk Assessment

Somerset County Council (2013) Local Flood Risk Management Strategy

Somerset County Council (2013) Minerals Plan Strategic Flood Risk Assessment – Update November 2013

Somerset County Council (2015) Somerset Minerals Plan Development Plan Document up to 2030, https://www.somerset.gov.uk/waste-planning-and-land/somerset-minerals-plan/

Somerset County Council (2015) West of England Sustainable Drainage Developer Guide, Issue 1

Somerset County Council (2014) Local Flood Risk Management Strategy, Somerset's flood risk management strategy for surface water, groundwater and ordinary watercourses, https://www.somerset.gov.uk/waste-planning-and-land/flood-and-water-management/February 2014

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Appendix A
Consultation with the LLFA

From: Lead Local Flood Authority [redacted]
Sent: 11 November 2020 14:31
To: Douglas, Guy <guy.douglas@woodplc.com>
Cc: Lead Local Flood Authority <[redacted]
Subject: RE: Westdown and Whatley Information Request

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Good afternoon Guy,

Many thanks for your time last week, to advise site assessment should determine the most appropriate means of surface water disposal taking into account the SuDS hierarchy, site specific issues and constraints. We suggest that Environment Agency, Internal Drainage Board and Wessex Water are consulted about any site-specific issues and requirements.

Any necessary changes to the hydrological system due to the works should be explained and quantified to ensure flood risk is not increased elsewhere. Details should also be provided on the measures during the construction, operation and post operation phases to ensure that surface water is managed appropriately and the measures in place to prevent pollution of the surrounding ground and surface waters and any blockages of the system.

If you could provide your query on flooding and development, I can then ensure that I accurately advise you on this point. If you have any further questions, please let me know.

As discussed, please see below for the details we would expect to see for the surface water drainage strategy at full and discharge of condition stages.

Full:

- Flood risk assessment and drainage strategy, which should detail any flood concern and how they will be overcome and show the proposed method of dealing with surface water with supporting information and calculations.
- Drawing and report illustrating the proposed surface water drainage system including location of SuDS features, manholes, external pipework, attenuation features, pumping stations (if required) and discharge locations
- Site constrains, and flooding issues onsite and downstream have been considered, and ensure that to ensure that as a minimum the proposed development does not exacerbate the problem. Natural flow paths for water of the site considered.

- Demonstration that the SuDS hierarchy has been considered in accordance with NPPF and justification for the proposed method of surface water discharge and Demonstration that best practice SuDS have been promoted, appropriate to the size and nature of development
- If pumped systems are proposed, justification for the use of these systems, summary of key design principles and assessment of residual risk. However, we strongly resist the use of these systems.
- Drawing to illustrate that attenuation structures are not located within an area at risk of fluvial or surface water flooding up to the 1 in 100+ climate change annual probability event, and rational behind this if this is the case.
- Drainage strategies should mimic existing drainage conditions as far as reasonably practical. Depending on location discharge rates should be limited to either pre-development (greenfield) conditions or restricted further, depending on IDB/Wessex Water/EA requirements.
- Calculations to demonstrate that the proposed surface water drainage system has been designed to prevent surcharging in all events up to an including the 1 in 2 annual probability storm event, prevent any flooding of the site in all events up to and including the 1 in 30 annual probability storm event, and demonstrate that surface water runoff up to the 1 in 100 year event plus climate change will be controlled without causing harm to people or properties.
- Assessment of attenuation volume needed with supporting calculations and methods.
- Demonstration that a viable connection can be made for discharge offsite. For connection to watercourse demonstrate that system can function under surcharged/ flood conditions.
- event. Including calculations that demonstrate that the half-drain time of any storage structures is less than 24 hours.
- Where it is proposed to discharge to a drainage system maintained/operated by other authorities (Environment Agency, internal drainage board, highway authority, sewerage undertaker, or Canals and River Trust), evidence of consultation and the acceptability of any discharge to their system should be presented for consideration.
- Confirmation of the proposed methods of treating surface water runoff to ensure no risk of pollution is introduced to groundwater or watercourses both locally and downstream of the site, especially from proposed parking and vehicular areas
- If access or works to third party land is required, details of these works and agreement in principal with necessary landowners/consenting authorities to cross third party land and/or make a connection to the proposed watercourse/sewer
- Consideration of maintenance and operation of the system for the lifetime of the development and access to the system

If infiltration proposed:

- Infiltration report showing testing has been undertake to BRE 365 digest standard. Summary of likely ground conditions including permeability and contamination risks. This should also show that there is a minimum of 1 m between the base of any infiltration feature and maximum groundwater level
- Confirmation of whether the site is located in a Source Protection Zone or Principal Aquifer and consent from EA if needed.
- Infiltration features designed to BRE Digest 365., detailed calculations of proposed infiltration systems and attenuation sizing demonstrating sufficient space within the site to ensure no increased flood risk up to the 1 in 100-year (+ climate change)

Discharge of Condition:

- Flood risk assessment and drainage strategy, which should detail any flood concern and how they will be overcome and show the proposed method of dealing with surface water with supporting information and calculations.
- Drawing and report illustrating the proposed surface water drainage system including location of SuDS features, manholes, external pipework, attenuation features, pumping stations (if required) and discharge locations
- Site constrains, and flooding issues onsite and downstream have been considered, and ensure that to ensure that as a minimum the proposed development does not exacerbate the problem
- Detailed drawings of proposed features such as infiltration structures, attenuation features, pumping stations and outfall structures
- Demonstration that the SuDS hierarchy has been considered in accordance with NPPF and justification for the proposed method of surface water discharge
- Demonstration that best practice SuDS have been promoted, appropriate to the size and nature of development
- If pumped systems are proposed, justification for the use of these systems, summary of key design principles and assessment of residual risk, with supporting calculations. However, we strongly resist the use of these systems.
- Drawing to illustrate that attenuation structures are not located within an area at risk of fluvial or surface water flooding up to the 1 in 100+ climate change annual probability event, and rational behind this if this is the case.
- Drainage strategies should mimic existing drainage conditions as far as reasonably practical. Depending on location discharge rates should be limited to either pre-development (greenfield) conditions or restricted further, depending on IDB/Wessex Water/EA requirements.

- Calculations to demonstrate that the proposed surface water drainage system has been designed to prevent surcharging in all events up to an including the 1 in 2 annual probability storm event, prevent any flooding of the site in all events up to and including the 1 in 30 annual probability storm event, and demonstrate that surface water runoff up to the 1 in 100 year event plus climate change will be controlled and retained within the site boundary without causing harm to people or properties..
- Assessment of attenuation volume needed with supporting calculations and methods using the SUDS hierarchy and to show viability.
- Demonstration that a viable connection can be made for discharge offsite.
- Assessment of potential failure of above-ground attenuation features, including assessment of residual risks to downstream receptors, and proposed mitigation and management measures
- If the development is to be delivered in phases, demonstration of proposed delivery and construction phasing plan.
- Calculations showing outfall matches proposed discharge rates.
- For discharge to a watercourse, consideration of the risk of water backing up the drainage system from any proposed outfall and how this risk will be managed without increasing flood risk to the site or to people, property and infrastructure elsewhere, noting that this also includes failure of flap valves
- Where it is proposed to discharge to a drainage system maintained/operated by other authorities (Environment Agency, internal drainage board, highway authority, sewerage undertaker, or Canals and River Trust), evidence of consultation and the acceptability of any discharge to their system should be presented for consideration.
- Demonstration of how the first 5mm of rainfall (or 'first flush') will be managed to promote infiltration/evaporation/evapotranspiration, and with focus on the removal of pollutants
- Confirmation of the proposed methods of treating surface water runoff to ensure no risk of pollution is introduced to groundwater or watercourses both locally and downstream of the site, especially from proposed parking and vehicular areas
- Natural flow paths for water of the site considered.
- Detailed drawing demonstrating exceedance routes and the management of surface water runoff during events that may temporarily exceed the capacity of the drainage system, including temporary exceedance of inlet features and conveyance features. Surface water should be retained within the site boundary and not pose risk to the development. Surface water exceedance routes should not pose a risk to people or properties.
- If access or works to third party land is required, details of these works and agreement in principal with necessary landowners/consenting authorities to cross third party land and/or make a connection to the proposed watercourse/sewer

- Confirmation of agreement of proposed adoption and maintenance arrangements for the surface water drainage system for the lifetime of the development including access and operational and maintenance manual. Any underground structures MUST be able to be adequality maintained and not situated on private land.

If infiltration is proposed:

- Infiltration report showing testing has been undertaken to BRE 365 digest standard. Summary of likely ground conditions including permeability and contamination risks. This should also show that there is a minimum of 1 m between the base of any infiltration feature and maximum groundwater level
- Confirmation of whether the site is located in a Source Protection Zone or Principal Aquifer and consent from EA if needed.
- Infiltration features designed to BRE Digest 365 standard, detailed calculations of proposed infiltration systems and attenuation sizing demonstrating sufficient space within the site to ensure no increased flood risk up to the 1 in 100-year (+ climate change) event. Including calculations that demonstrate that the half-drain time of any storage structures is less than 24 hours.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] www.somerset.gov.uk

As a result of coronavirus, all Somerset County Council staff have been asked to work from home, where this is practically possible, or to support other services if their role is not critical to the coronavirus response. This will have an impact on our ability to deliver some services, so we thank you for your patience and understanding during this difficult time.

From: Douglas, Guy <guy.douglas@woodplc.com>
Sent: 16 October 2020 16:01
To: Lead Local Flood Authority [redacted]
Subject: FW: Westdown and Whatley Information Request

Hi [redacted]

Following on from my email below I was wondering if I could arrange a call with a member of your team to discuss proposals at Westdown Quarry in relation to areas mapped as Flood Zones along the Fordbury Water. Would it be possible to arrange a call next week?

Kind Regards,
Guy

From: Douglas, Guy
Sent: 16 September 2020 16:01
To: [redacted]
Cc: Braid, Ana [redacted]
Subject: Westdown and Whatley Information Request

Good afternoon,

Further to an information request set to Somerset County Council on the 10th August below in relation to an EIA and FRA for Whatley and Westdown Quarries could you let me know of any localised flooding and drainage issues, such as:

- Provide details of any areas of known historic flooding events which took pleace along the rivers in the study area, namely along the Whatley Brook/ Fordbury Water, the Nunney Brook, River Mells/ Stream.
- Provide details of any areas of concern relating to sources of flood risk (surface water, fluvial, groundwater, sewer, artificial where applicable) in the vicinity of the Whatley and Westdown quarries
- Details of the watercourse crossing structure downstream of Whatley and Westdown quarries, for instance the Bulls Green Road adjacent and to the north of the Westdown quarry (if known); and
- any other specific supplementary guidance on drainage policy including greenfield runoff and SuDS requirements?

Julian the EA passed on your details as well to get in touch with you as well as SCC.

Thanks,
Guy

Guy Douglas
Senior Consultant – Water Management
Direct: +44 (0)141 2221230
www.woodplc.com

From: Lead Local Flood Authority <[redacted]
Sent: 20 August 2020 08:50
To: Douglas, Guy <guy.douglas@woodplc.com>
Cc: Lead Local Flood Authority [redacted]
Subject: RE: Data Request - Whatley and Westdown

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Good morning Guy,

Many thanks for your email. We will look to provide the information we hold within the next few weeks.

Kind regards,

[redacted]

[redacted]
Graduate– Flood Risk Management
Community Infrastructure Commissioning
Somerset County Council

As a result of coronavirus, all Somerset County Council staff have been asked to work from home, where this is practically possible, or to support other services if their role is not critical to the coronavirus response. This will have an impact on our ability to deliver some services, so we thank you for your patience and understanding during this difficult time.

From: Douglas, Guy <guy.douglas@woodplc.com>
Sent: 10 August 2020 19:53
To: Lead Local Flood Authority <[redacted]
Subject: Data Request - Whatley and Westdown

Good evening,

I work for Wood Plc and am providing support on the water environment to Hanson Aggregates UK in relation to their Whatley and Westdown quarries in the south west of England near Frome in Somerset.

In order to inform an Environmental Impact Assessment and Flood Risk Assessment I would like to make the following information requests for the attached search area (in black outline) shown in the pdf and supporting shapefiles:

- Provide details of any areas of known historic flooding events which took please along the rivers in the study area, namely along the Whatley Brook/ Fordbury Water, the Nunney Brook, River Mells/ Stream.

- Provide details of any areas of concern relating to sources of flood risk (surface water, fluvial, groundwater, sewer, artificial where applicable) in the vicinity of the Whatley and Westdown quarries
- Details of the watercourse crossing structure downstream of Whatley and Westdown quarries, for instance the Bulls Green Road adjacent and to the north of the Westdown quarry (if known).

If you have any questions please let me know.

Many thanks in advance,
Guy

Guy Douglas
Senior Consultant – Water Management
Direct: +44 (0)141 2221230
www.woodplc.com

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From: Lead Local Flood Authority <[redacted]
Sent: 04 September 2020 08:16
To: Douglas, Guy <guy.douglas@woodplc.com>
Cc: Lead Local Flood Authority [redacted]>
Subject: RE: Data Request - Whatley and Westdown

Good morning Guy,

Many thanks for your request. Please find our response below:

1. Please find flood incident report attached from our database. Details of any S19 Investigations can be found on our website at https://www.somerset.gov.uk/waste-planning-and-land/flood-investigations/. The report attached is for information purposes only and should not be published or distributed without written permission from Somerset County Council. Please be aware that our historic flooding data may not be a comprehensive record as incidents may occur and not be reported to us. The Flood Incident Data is derived from SCC's Historical Database and cannot be used to identify individual properties that have flooded.
2. Please visit https://flood-warning-information.service.gov.uk/long-term-flood-risk/map
3. Please contact SCC Highways, Bridges and Structures.

Kind regards,

Flood Risk Management Team
Community Infrastructure Commissioning
Somerset County Council

As a result of coronavirus, all Somerset County Council staff have been asked to work from home, where this is practically possible, or to support other services if their role is not critical to the coronavirus response. This will have an impact on our ability to deliver some services, so we thank you for your patience and understanding during this difficult time.

From: Douglas, Guy <guy.douglas@woodplc.com>
Sent: 10 August 2020 19:53
To: Lead Local Flood Authority <[redacted]
Subject: Data Request - Whatley and Westdown

Good evening,

I work for Wood Plc and am providing support on the water environment to Hanson Aggregates UK in relation to their Whatley and Westdown quarries in the south west of England near Frome in Somerset.

In order to inform an Environmental Impact Assessment and Flood Risk Assessment I would like to make the following information requests for the attached search area (in black outline) shown in the pdf and supporting shapefiles:

- Provide details of any areas of known historic flooding events which took pleace along the rivers in the study area, namely along the Whatley Brook/ Fordbury Water, the Nunney Brook, River Mells/ Stream.
- Provide details of any areas of concern relating to sources of flood risk (surface water, fluvial, groundwater, sewer, artificial where applicable) in the vicinity of the Whatley and Westdown quarries
- Details of the watercourse crossing structure downstream of Whatley and Westdown quarries, for instance the Bulls Green Road adjacent and to the north of the Westdown quarry (if known).

If you have any questions please let me know.

Many thanks in advance,
Guy

Guy Douglas
Senior Consultant – Water Management
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Extract from Somerset County Council's Historical Flood Database

Town Village: Berkley Location: Limerick Lane Location ID 154

Location ID: 154 **Postcode:** BA11 6TQ **Event Ref:** CF 1368 **Date:** 06/01/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding in road due to blocked grips.

Location ID: 154 **Postcode:** BA11 6TQ **Event Ref:** CF 3143 **Date:** 03/01/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding by St Georges Cross Farm on Pot Lane, been like this for 2/3 weeks now, thinks the drains must be

Location ID: 154 **Postcode:** BA11 5JH **Event Ref:** CF 3460 **Date:** 04/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Police request road closure signs as road flooded and cars are getting stuck.

Location ID: 154 **Postcode:** BA11 6TQ **Event Ref:** PC 154 **Date:** Various **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flooding where Limerick Ln joins Pott Ln.

Location ID: 503 **Postcode:** BA4 4EQ **Event Ref:** CF 3546 **Date:** 22/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Flooding to road.

Location ID: 206 **Postcode:** BA11 5JY **Event Ref:** FF 403 **Date:** 28/10/1960 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Bottom of Easthill on main road A362

Location ID: 206 **Postcode:** BA11 1BE **Event Ref:** HD 206 **Date:** 10/07/1968 **Types Affected:** Houses, shops **Properties Affected:** 15
Flood Source: River Frome **Frequency:** Rare
Details: Flooding to town centre.

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The information derived from SCC's Historical Database cannot be used to identify individual properties that have flooded. This is provided for information purposes only and should not be published or distributed without written permission from Somerset County Council.

Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Welshmill Lane Location ID 206

Location ID: 206 **Postcode:** BA11 2LX **Event Ref:** FF 434 **Date:** 30/05/1979 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Welshmill Lane flooded

Location ID: 206 **Postcode:** BA11 1FE **Event Ref:** FF 499 **Date:** 02/02/1990 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flood across road up to six inches (0.15m) deep.

Location ID: 206 **Postcode:** BA11 2HH **Event Ref:** FS 1550 **Date:** 25/06/2005 **Types Affected:** Houses **Properties Affected:** 3
Flood Source: Surface/ stream **Frequency:** Regularly
Details: Flooding to property.

Location ID: 206 **Postcode:** BA11 1RZ **Event Ref:** CF 2490 **Date:** 18/02/2010 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding at the centre again caused by ongoing problems with drainage.

Location ID: 206 **Postcode:** BA11 2PB **Event Ref:** CF 2509 **Date:** 11/11/2010 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road is flooded, possible blocked drains.

Location ID: 206 **Postcode:** BA11 2PA **Event Ref:** CF 2517 **Date:** 19/11/2010 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road floods due to blocked gullys.

Location ID: 206 **Postcode:** BA11 2EE **Event Ref:** CF 1371 **Date:** 06/01/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Blocked drainage along road, nr surgery.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Welshmill Road Location ID 206

Location ID: 206 **Postcode:** BA11 2JP **Event Ref:** CF 1432 **Date:** 14/02/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Surface water on road due to blocked drain.

Location ID: 206 **Postcode:** BA11 2EJ **Event Ref:** CF 1436 **Date:** 16/02/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Water is gathering at the corner as the road slopes away from the drain.

Location ID: 206 **Postcode:** BA11 2PA **Event Ref:** CF 1466 **Date:** 22/06/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road flooded due to blocked drains.

Location ID: 206 **Postcode:** BA11 1HH **Event Ref:** CF 1629 **Date:** 06/09/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding to pavement and carriageway

Location ID: 206 **Postcode:** BA11 2XA **Event Ref:** CF 1656 **Date:** 30/09/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding outside property due to blocked drain.

Location ID: 206 **Postcode:** BA11 3HE **Event Ref:** CF 1667 **Date:** 13/10/2011 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Drainage **Frequency:** Regularly
Details: Water entering property due to blocked gully.

Location ID: 206 **Postcode:** BA11 1DA **Event Ref:** CF 1681 **Date:** 03/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Water was within a couple of inches of entering the properties basements.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Keyford Place Location ID 206

Location ID: 206 **Postcode:** BA11 1JE **Event Ref:** CF 1792 **Date:** 03/01/2012 **Types Affected:** Houses
Properties Affected: 1
Flood Source: Surface **Frequency:** Rare
Details: Property was flooded due to water run off from Randolph Road.

Location ID: 206 **Postcode:** BA11 4EE **Event Ref:** CF 1941 **Date:** 03/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: The road is flooded and water is going into the garages.

Location ID: 206 **Postcode:** BA11 3BQ **Event Ref:** CF 1975 **Date:** 19/03/2012 **Types Affected:** Houses
Properties Affected: 1
Flood Source: Drainage **Frequency:** Rare
Details: Callers basement is flooding when it rains.

Location ID: 206 **Postcode:** BA11 2PA **Event Ref:** CF 2005 **Date:** 18/04/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road flooding due to blocked gullies.

Location ID: 206 **Postcode:** BA11 2BJ **Event Ref:** CF 2008 **Date:** 20/04/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Gardens of bungalows at lower levels of cul-de-sac are flooding.

Location ID: 206 **Postcode:** BA11 3JQ **Event Ref:** HD 1988 **Date:** 29/04/2012 **Types Affected:** Fields **Properties Affected:** 0
Flood Source: Mells Stream **Frequency:** Rare
Details: Flooding to wooded area.

Location ID: 206 **Postcode:** BA11 2AN **Event Ref:** CF 2123 **Date:** 01/05/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Drain at Rodden Road Garage is overflowing and flooding the road.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Castle Street Location ID 206

Location ID: 206 **Postcode:** BA11 3BW **Event Ref:** CF 2184 **Date:** 01/05/2012 **Types Affected:** Houses
Properties Affected: 1
Flood Source: Surface **Frequency:** Rare
Details: Due to the rain they have flooded.

Location ID: 206 **Postcode:** BA11 2NX **Event Ref:** CF 2321 **Date:** 29/08/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Two blocked drains causing flooding to road.

Location ID: 206 **Postcode:** BA11 5JY **Event Ref:** CF 2577 **Date:** 18/10/2012 **Types Affected:** Houses, roads
Properties Affected: 2
Flood Source: Drainage **Frequency:** Rare
Details: Several drains blocked here, they were flooded last night due to this.

Location ID: 206 **Postcode:** BA11 2EJ **Event Ref:** CF 2706 **Date:** 21/11/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: The road is flooded right across the road, up to the height of the footpath.

Location ID: 206 **Postcode:** BA11 5JY **Event Ref:** HD 2651 **Date:** 24/11/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flooding to road junction.

Location ID: 206 **Postcode:** BA11 3ED **Event Ref:** CF 3073 **Date:** 19/12/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Flooding occurring here, thinks work was done at weekend but this has not helped and road will flood badly if

Location ID: 206 **Postcode:** BA11 2PA **Event Ref:** CF 3087 **Date:** 20/12/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: On coal ash lane, where the Railway bridge is, there is standing water on the road.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Garsdale Location ID 206

Location ID: 206 **Postcode:** BA11 1RZ **Event Ref:** CF 3233 **Date:** 29/07/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road flooded, people unable to enter the Saxonvale Centre, gullys clear, due volume of water.

Location ID: 206 **Postcode:** BA11 2PB **Event Ref:** CF 3238 **Date:** 05/08/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road flooded.

Location ID: 206 **Postcode:** BA11 4AR **Event Ref:** CF 3256 **Date:** 03/10/2013 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Drainage **Frequency:** Regularly
Details: The drain on the pavement lifted and flooded her property.

Location ID: 206 **Postcode:** BA11 1QZ **Event Ref:** CF 3275 **Date:** 28/10/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flood water all over the road, out of hours gang attended site and erected flood signs.

Location ID: 206 **Postcode:** BA11 2PB **Event Ref:** CF 3321 **Date:** 05/11/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flood all across the road only one car going through at a time.

Location ID: 206 **Postcode:** BA11 1HH **Event Ref:** CF 3336 **Date:** 20/11/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flooding in this area.

Location ID: 206 **Postcode:** BA11 2PA **Event Ref:** CF 3350 **Date:** 19/12/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Underneath the railway bridge the road is completely flooded.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Portway Location ID 206

Location ID: 206 **Postcode:** BA11 1QZ **Event Ref:** CF 3365 **Date:** 23/12/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: River Frome **Frequency:** Regularly
Details: Police called to report that there is severe flooding and they are asking for signage.

Location ID: 206 **Postcode:** BA11 5LE **Event Ref:** CF 3396 **Date:** 24/12/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Rodden Brook **Frequency:** Regularly
Details: The road is flooded by the ASDA roundabout.

Location ID: 206 **Postcode:** BA11 5LE **Event Ref:** CF 3432 **Date:** 02/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Road is passable, but vehicles travelling too fast and causing water waves to hit local properties.

Location ID: 206 **Postcode:** BA11 2HD **Event Ref:** CF 3455 **Date:** 03/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Flooding on the road, concerned that property will flood.

Location ID: 206 **Postcode:** BA11 5BD **Event Ref:** CF 3467 **Date:** 04/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Request for flooding signage.

Location ID: 206 **Postcode:** BA11 1RZ **Event Ref:** CF 3489 **Date:** 07/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Deep flooding here, unable to open their car park gates to the building due to the flood water.

Location ID: 206 **Postcode:** BA11 1BH **Event Ref:** CF 3575 **Date:** 05/02/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Road is flooded and causing a hazard.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Frome Location: Catherine Street Location ID 206

Location ID: 206 **Postcode:** BA11 1DA **Event Ref:** HD 243 **Date:** Various **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Local roads flooded.

Location ID: 232 **Postcode:** BA3 5QZ **Event Ref:** FF 406 **Date:** 04/12/1960 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Stream **Frequency:** Regularly
Details: Road floods occasionally stopping traffic.

Location ID: 232 **Postcode:** BA3 5QZ **Event Ref:** FF 650 **Date:** 01/08/1995 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Road floods.

Location ID: 232 **Postcode:** BA11 3LR **Event Ref:** CF 1367 **Date:** 04/01/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding in road due to blocked grips.

Location ID: 232 **Postcode:** BA3 5QZ **Event Ref:** HD 1751 **Date:** 22/12/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: The drain appears to be blocked and the road has been awash for several days.

Location ID: 232 **Postcode:** BA3 5QX **Event Ref:** CF 1932 **Date:** 06/01/2012 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Drainage **Frequency:** Rare
Details: Blocked drain causing flooding to road & callers property.

Location ID: 232 **Postcode:** BA3 5QX **Event Ref:** CF 2049 **Date:** 30/04/2012 **Types Affected:** Houses **Properties Affected:** 2
Flood Source: Drainage **Frequency:** Regularly
Details: Drains blocking up in Tadhill, houses flooding.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Leigh upon Mendip Location: Quarry Lane Location ID 232

Location ID: 232 **Postcode:** BA3 5QG **Event Ref:** CF 2152 **Date:** 09/05/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Blocked drains causing flooding on road.

Location ID: 232 **Postcode:** BA3 5QS **Event Ref:** CF 2747 **Date:** 21/11/2012 **Types Affected:** Houses, roads **Properties Affected:** 1
Flood Source: Surface **Frequency:** Rare
Details: The road is flooded and coming in to the house.

Location ID: 232 **Postcode:** BA3 5QR **Event Ref:** CF 3479 **Date:** 06/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Culvert **Frequency:** Rare
Details: Culvert has overflowed and badly flooded the road.

Location ID: 232 **Postcode:** BA3 5QG **Event Ref:** CF 3625 **Date:** 13/02/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Blocked gully causing flooding to carriageway.

Location ID: 232 **Postcode:** BA3 5QZ **Event Ref:** HD 232 **Date:** Various **Types Affected:** Houses **Properties Affected:** 3
Flood Source: Surface **Frequency:** Rare
Details: Local roads flood during heavy rain.

Location ID: 198 **Postcode:** BA11 4LX **Event Ref:** PC 198 **Date:** 03/08/1965 **Types Affected:** Houses, shops **Properties Affected:** 10
Flood Source: Nunney Brook/ Surface **Frequency:** Rare
Details: Large flooding to village. See photos.

Location ID: 198 **Postcode:** BA11 4LX **Event Ref:** HD 906 **Date:** 10/07/1968 **Types Affected:** Houses **Properties Affected:** 5
Flood Source: Nunney Brook **Frequency:** Rare
Details: Five properties flooded due to Nunney Brook.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Nunney Location: Market Place Location ID 198

Location ID: 198 **Postcode:** BA11 4LY **Event Ref:** PC 199 **Date:** 01/09/1995 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Nunney Brook/ Surface **Frequency:** 1 in 10
Details: Local roads flooded, not as bad as 65.

Location ID: 198 **Postcode:** BA11 4NH **Event Ref:** FS 1578 **Date:** 2000 **Types Affected:** Houses **Properties Affected:** 3
Flood Source: Nunney Brook **Frequency:** Rare
Details: Flooding to Castle Green cottage.

Location ID: 198 **Postcode:** BA11 4LY **Event Ref:** PC 200 **Date:** 2003 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Nunney Brook/ Surface **Frequency:** 1 in 5
Details: Local roads flooded, not as bad as 65.

Location ID: 198 **Postcode:** BA11 4NH **Event Ref:** PC 201 **Date:** 28/05/2008 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Nunney Brook/ Surface **Frequency:** Rare
Details: Local roads flooded, not as bad as 65.

Location ID: 198 **Postcode:** BA11 4LX **Event Ref:** CF 1637 **Date:** 06/09/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Blocked drains causing flooding when it rains.

Location ID: 198 **Postcode:** BA11 4PZ **Event Ref:** CF 1732 **Date:** 17/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Blocked drains are causing the water to run from the hill.

Location ID: 198 **Postcode:** BA11 4LY **Event Ref:** CF 2063 **Date:** 30/04/2012 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Drainage **Frequency:** Regularly
Details: Blocked gullies, house was flooded yesterday.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Nunney Location: A359 Location ID 198

Location ID: 198 **Postcode:** BA11 4NX **Event Ref:** CF 2535 **Date:** 11/10/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Police report flooding on road, no indication of amount of water.

Location ID: 198 **Postcode:** BA11 4NU **Event Ref:** CF 2669 **Date:** 05/11/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Lane has been flooded for the last few days.

Location ID: 198 **Postcode:** BA11 4LY **Event Ref:** HD 2988 **Date:** 21/11/2012 **Types Affected:** Houses, roads **Properties Affected:** 1
Flood Source: Surface **Frequency:** Regularly
Details: 50mm of surface water caused flooding to a properties.

Location ID: 198 **Postcode:** BA11 4NU **Event Ref:** CF 3182 **Date:** 29/01/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: 100 yards of flood water 6-8ft deep.

Location ID: 198 **Postcode:** BA11 4NS **Event Ref:** CF 3541 **Date:** 22/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Water building up on the road.

Location ID: 198 **Postcode:** BA11 4PZ **Event Ref:** HD 230 **Date:** Various **Types Affected:** Houses **Properties Affected:** 3
Flood Source: Nunney Brook **Frequency:** Rare
Details: Localised flooding to roads.

Location ID: 198 **Postcode:** BA11 4NN **Event Ref:** HD 231 **Date:** Various **Types Affected:** Fields **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Flooding to fields.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Oldford, Frome Location: Iron Mill Lane Location ID 383

Location ID: 383 **Postcode:** BA11 2NR **Event Ref:** CF 1809 **Date:** 03/01/2012 **Types Affected:** Houses
Properties Affected: 1
Flood Source: Drainage **Frequency:** Rare
Details: Drains are blocked and water is entering properties and garages.

Location ID: 383 **Postcode:** BA11 2NR **Event Ref:** CF 3072 **Date:** 14/12/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Serious flooding with several inches of water remaining on the road for over 24hours.

Location ID: 65 **Postcode:** BA4 5EW **Event Ref:** HD 2229 **Date:** 12/07/1982 **Types Affected:** Houses, school
Properties Affected: 15
Flood Source: River Sheppy **Frequency:** Regularly
Details: Black Monday as it came to be known, severe floods left trails of devastation.

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** HD 65 **Date:** 20/10/2006 **Types Affected:** Houses **Properties Affected:** 3
Flood Source: River Sheppey **Frequency:** Rare
Details: The river floods after heavy rain.

Location ID: 65 **Postcode:** BA4 5YG **Event Ref:** HD 75 **Date:** 14/08/2007 **Types Affected:** Houses **Properties Affected:** 3
Flood Source: River Sheppey **Frequency:** Rare
Details: Flash flood.

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** CF 2448 **Date:** 06/12/2007 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Blocked drains causing surface water and flooding to callers yard.

Location ID: 65 **Postcode:** BA4 5LT **Event Ref:** HD 908 **Date:** 11/01/2008 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Surface **Frequency:** Rare
Details: Viaduct at Victoria Grove and prison.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Cannards Grave Rd Location ID 65

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** HD 97 **Date:** 29/05/2008 **Types Affected:** Houses, shops
Properties Affected: 5
Flood Source: River Sheppey **Frequency:** Rare
Details: Flash floods across Somerset

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** CF 2449 **Date:** 04/11/2009 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flooding in carriageway

Location ID: 65 **Postcode:** BA4 5BX **Event Ref:** CF 2450 **Date:** 24/11/2009 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Flooding on the roundabout blocked drain

Location ID: 65 **Postcode:** BA4 5JS **Event Ref:** CF 1470 **Date:** 24/06/2011 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Drainage **Frequency:** Regularly
Details: Water runs into the garden and house rather than down the drains.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 1478 **Date:** 19/07/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: River Sheppy **Frequency:** Regularly
Details: Between Bodden Lane and Frog Lane.

Location ID: 65 **Postcode:** BA4 5JS **Event Ref:** CF 1680 **Date:** 03/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Police report flooding on road due to blocked drains.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 1684 **Date:** 04/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Road flooded badly on bend, across both carriageways.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Wells Road Location ID 65

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** CF 2451 **Date:** 04/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Water 1/2 ft deep, flooding across all the road, signs needed.

Location ID: 65 **Postcode:** BA4 5FF **Event Ref:** CF 1706 **Date:** 06/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Culvert **Frequency:** Regularly
Details: Flooding in road due to blocked culvery.

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** CF 1712 **Date:** 18/11/2011 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Water 1/2 ft deep, flooding across all the road.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** HD 1869 **Date:** 03/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: 2ft of water reported in road.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 1778 **Date:** 03/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Flooding and tree blocking road.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** CF 1784 **Date:** 03/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: The A371 is flooded across both sides of the road.

Location ID: 65 **Postcode:** BA4 5AT **Event Ref:** CF 1918 **Date:** 03/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Volume of water issue/ flash flood drains unable to cope short term.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Old Wells Road Location ID 65

Location ID: 65 **Postcode:** BA4 4PF **Event Ref:** CF 1889 **Date:** 26/01/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Police advise the road here is flooded and its causing a nuisance to traffic.

Location ID: 65 **Postcode:** BA4 4PF **Event Ref:** CF 2126 **Date:** 02/05/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding along Old Wells Road at usual location (stone culvert).

Location ID: 65 **Postcode:** BA4 5FF **Event Ref:** CF 2207 **Date:** 23/06/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Flooding right across the road at the weekend.

Location ID: 65 **Postcode:** BA4 5JH **Event Ref:** HD 2214 **Date:** 11/07/2012 **Types Affected:** School **Properties Affected:** 1
Flood Source: River Sheppey **Frequency:** Regularly
Details: 50 youngsters from Bowlish Infants School were moved after 30mm of rain in half an hour.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** HD 2217 **Date:** 11/07/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Cloud burst that dumped 30mm or rain in 2 hours over a very localised area.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 2244 **Date:** 11/07/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Cars just managing to get through, police ask for road closure.

Location ID: 65 **Postcode:** BA4 4PF **Event Ref:** CF 2245 **Date:** 11/07/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Police called to report flooding, water is waist deep.

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Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Cannards Grave Rd Location ID 65

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** CF 2246 **Date:** 11/07/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Requested flood signs to be placed at either end of this road.

Location ID: 65 **Postcode:** BA4 5EW **Event Ref:** CF 2248 **Date:** 11/07/2012 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: River Sheppy **Frequency:** Regularly
Details: One property has flooded and water is appearing on road after the river burst its bank.

Location ID: 65 **Postcode:** BA4 5UW **Event Ref:** CF 2250 **Date:** 11/07/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: From the old railway bridge to Old Wells Road flooded about 4 inches deep.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 2559 **Date:** 09/10/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Water at the moment goes nearly the length of the road and affects about 10 houses including the hotel.

Location ID: 65 **Postcode:** BA4 4PF **Event Ref:** CF 2561 **Date:** 09/10/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: The road is flooded and the water is backing up to the yard gate.

Location ID: 65 **Postcode:** BA4 4TR **Event Ref:** CF 2546 **Date:** 10/10/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: The tenants were stranded at their property for 4 days until the water subsided.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** HD 2557 **Date:** 04/11/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Snowfall over the Mendips was followed by torrential rain and flooding in many areas.

NB: *Disclaimer: All information shown on this document is derived from electronic records obtained by third parties and held by Somerset County Council (SCC), this information are frequently updated and amended. Somerset County Council is not responsible for the accuracy of this information nor can it offer any assurance that the information provided is accurately reflected.*
The information derived from SCC's Historical Database cannot be used to identify individual properties that have flooded. This is provided for information purposes only and should not be published or distributed without written permission from Somerset County Council.

Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Frog Lane Location ID 65

Location ID: 65 **Postcode:** BA4 4PP **Event Ref:** CF 2729 **Date:** 21/11/2012 **Types Affected:** Houses, roads
Properties Affected: 1
Flood Source: Surface **Frequency:** Regularly
Details: Road flooded up to callers door not just today this happened when we get rain.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** CF 2738 **Date:** 21/11/2012 **Types Affected:** Houses, roads
Properties Affected: 3
Flood Source: Surface **Frequency:** Regularly
Details: Road has become flooded all residents are having to use sandbags as they are at risk of flooding.

Location ID: 65 **Postcode:** BA4 5PE **Event Ref:** CF 2759 **Date:** 21/11/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Paul st is all flooded near prison, would like signs put up to prevent cars getting stuck.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** CF 3083 **Date:** 20/12/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road is very badly flooded and it is like this for about 100m.

Location ID: 65 **Postcode:** BA4 4LZ **Event Ref:** CF 3121 **Date:** 29/12/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Request signage for flooding at this location.

Location ID: 65 **Postcode:** BA4 5UN **Event Ref:** CF 3334 **Date:** 15/11/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Place out flood signs to cover carriageway from crossroads down hill towards junction of Kent Lane.

Location ID: 65 **Postcode:** BA4 5LU **Event Ref:** CF 3409 **Date:** 30/12/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Regularly
Details: Road by the prison keeps flooding during bad weather.

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The information derived from SCC's Historical Database cannot be used to identify individual properties that have flooded. This is provided for information purposes only and should not be published or distributed without written permission from Somerset County Council.

Extract from Somerset County Council's Historical Flood Database

Town Village: Shepton Mallet Location: Cannards Grave Rd Location ID 65

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** HD 3308 **Date:** 06/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Regularly
Details: Flooding to Cannards Grave Road.

Location ID: 65 **Postcode:** BA4 5HF **Event Ref:** CF 3518 **Date:** 14/01/2014 **Types Affected:** Road **Properties Affected:** 0
Flood Source: River Sheppy **Frequency:** Regularly
Details: Flooding to the bottom of Back Lane.

Location ID: 65 **Postcode:** BA4 5RP **Event Ref:** HD 241 **Date:** Various **Types Affected:** Road **Properties Affected:** 0
Flood Source: Surface **Frequency:** Rare
Details: Localised flooding to roads.

Location ID: 233 **Postcode:** BA3 5HP **Event Ref:** CF 1980 **Date:** 09/02/2012 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: Blocked gully causing road to flood.

Location ID: 233 **Postcode:** BA3 5HW **Event Ref:** HD 233 **Date:** Various **Types Affected:** Road **Properties Affected:** 0
Flood Source: Mells Stream/ Surface **Frequency:** Rare
Details: Localised flooding to roads.

Location ID: 498 **Postcode:** BA11 5DG **Event Ref:** CF 3340 **Date:** 02/12/2013 **Types Affected:** Road **Properties Affected:** 0
Flood Source: Drainage **Frequency:** Rare
Details: There is flooding on the road near Sunnyside Farm.

NB: *Disclaimer: All information shown on this document is derived from electronic records obtained by third parties and held by Somerset County Council (SCC), this information are frequently updated and amended. Somerset County Council is not responsible for the accuracy of this information nor can it offer any assurance that the information provided is accurately reflected.*
The information derived from SCC's Historical Database cannot be used to identify individual properties that have flooded. This is provided for information purposes only and should not be published or distributed without written permission from Somerset County Council.

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Appendix B
Correspondence with the EA

creating a better place

Environment Agency

Guy Douglas
John Wood Group PLC
Guy.douglas@woodplc.com

Our ref: 183174-WX
Your ref:
Date: 15 September 2020

Dear Guy

Information request for: **Whatley & Westdown Quarry, Frome**

Thank you for your enquiry which was received on 10 August 2020.

Name	Product 6
Description	Model Output Data for model: Bristol Avon JFLOW 2006
Sharefile link	https://ea.sharefile.com/d-sba88f0b4b364dfb8
Conditions	1 You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2 Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3 We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentialities of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. 4.1 The Information may contain some data that we believe is within the definition of "personal data" under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual. 4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data. 5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2. Information about the operation of flood assets should not be published. 6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as "the Data".

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Phone: [redacted]
Email: [redacted]

	6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights.

Please note: The above sharefile link will remain active until 9 October 2020

Surface water risk maps and historic flood data is available for free to download on the gov.uk website.

Further Information
We advise that you also contact the drainage engineer, [redacted], on [redacted] or by email, [redacted] at Mendip District Council, Council Offices, Cannards Grave Road, Shepton Mallet, BA4 5BT and the Flood Risk Management Team, by email [redacted] or by telephone, [redacted] at Somerset County Council, County Hall, Taunton, Somerset as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful.

Yours sincerely

[redacted]

[redacted]

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: [redacted]
Telephone number: [redacted]

creating a better place

Environment Agency

Guy Douglas
John Wood Group PLC
Guy.douglas@woodplc.com

Our ref: 183174-WX
Your ref:
Date: 15 September 2020

Dear Guy

Information request for: **Whatley & Westdown Quarry, Frome**

Thank you for your enquiry which was received on 10 August 2020.

Please refer to Open Government Licence which explains the permitted use of this information.

Name	Product 5
Description	Model report: Bristol Avon JFLOW 2006
Information Warnings	*Any mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2019 Ordnance Survey 100024198.

Further Information
We advise that you also contact the drainage engineer, [redacted] on [redacted] or by email, [redacted], at Mendip District Council, Council Offices, Cannards Grave Road, Shepton Mallet, BA4 5BT and the Flood Risk Management Team, by email [redacted] or by telephone, [redacted] at Somerset County Council, County Hall, Taunton, Somerset as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful.

Yours sincerely

[redacted]

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: [redacted]
Telephone number: [redacted]

Wessex Enquiries <WessexEnquiries@environment-agency.gov.uk>

187286-WX :(was 183174-WX) : Whatley and Westdown Quarry - Data Request (EIA/FRA)

Fri 23/10/2020 09:59

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Mr Guy, thank you for your enquiry below, which we received on 1 October 2020. Our response are in **bold**, below.

RE: Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental Information Regulations 2004 (EIR)

Surface water abstractions and discharge consents that are situated within the 'surface water study area'?
Groundwater abstractions and discharge consents situated within the 'groundwater study area'?
Previously sent to you in response to request 183174-WX

Other groundwater level information for other boreholes in the 'groundwater search area'
Please find attached whole of record groundwater data for the five nearest sites to the locations requested:-

- **Wall Tyning (ST672458)**
- **Oakhill No 2 (ST653464)**
- **Southfield Ho Whatly (ST730468)**
- **Oakhill No 1 (ST656479)**
- **Finger Valley 1 (ST714481)**

Bristol Avon 2006 flood model GIS files (depths for 1 in 100 and 1 in 1000 year return period) which were previously sent through accounts for a climate change allowance?
Please note that this data is from JFLOW, a 2 Dimensional Generalised Model that does not include climate change allowance. Typically water depth and/or level outputs from this model are only suitable to be used for decision making at a broad catchment scale rather than for the purpose of a site specific flood risk assessment. This modelling is fit for producing Flood Zone outlines for our Flood Map for Planning, which is used in spatial planning. However, it is not based on specific channel survey and we cannot guarantee the accuracy of the water depth/level data. Although it is currently our best available data for this location.

I hope that we have correctly interpreted your request. Please refer to the Open Government Licence which explains the permitted use of this information.

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within two calendar months to ask for our decision to be reviewed.

Yours sincerely

[redacted]
Environment Agency
Customer & Engagement, Wessex Area
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Wessex Team: [redacted]
Email: [redacted]

From: Douglas, Guy [mailto:guy.douglas@woodplc.com]
Sent: 01 October 2020 10:28
To: Wessex Enquiries [redacted]
Subject: 187286 WX: (was 183174-WX) : Whatley and Westdown Quarry - Data Request (EIA/FRA)

Hi [redacted]

Thanks for chatting earlier. As discussed I have reduced the study area extents to help with minimise the processing requirements of the data request.

Please find attached a surface water study area and groundwater study area for your information.

Could you send me:

- Surface water abstractions and discharge consents that are situated within the 'surface water study area'?
- Groundwater abstractions and discharge consents situated within the 'groundwater study area'?

I've gone back and checked the hydrometric data and found the Westdown Farm_Nunney groundwater level information. As discussed could you send us any other groundwater level information for other boreholes in the 'groundwater search area'? For instance but not limited to Asham quarry, Shute Farm, West Cranmore etc

Lastly I wanted to check if the Bristol Avon 2006 flood model GIS files (depths for 1 in 100 and 1 in 1000 year return period) which were previously sent through accounts for a climate change allowance?

Can you let me know if the data above can be sent across and when I can expect it by?

Thanks,
Guy

From: Wessex Enquiries [redacted]
Sent: 25 September 2020 15:55
To: Douglas, Guy <guy.douglas@woodplc.com>
Subject: 183174-WX : Whatley and Westdown Quarry - Data Request (EIA/FRA)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Dear Mr Douglas

Thank you for your email.

To clarify it would take three days to download prepare and send all the permits you need. Only by downloading the permits would you get the permit conditions information for each permit you have asked for. This is the time consuming part of the request.

The Groundwater information we have provided you in our part response we sent to you on 15th September.
Please see all the information below -

- Groundwater quality data. Most recent groundwater Source Protection Zones (SPZs) for any abstraction locations. Groundwater quality data from the superficials and/or the deeper bedrock and (as for water levels) related observation borehole information (OBH name, coordinates, aquifer, datum in mAOD, construction details);

  See DEFRA Magic Map online https://magic.defra.gov.uk/MagicMap.aspx
  The table below lists the boreholes within the Mendips-Whatley catchment from which the EA take routine samples for hydrochemical analysis, as part of the Groundwater Quality Monitoring Network. These boreholes are all in the WFD groundwater body 'G8046 Mendips'.

  The sampling data from these sites can be freely accessed on line using the Open Data system – please see guidance/instructions below on how to access. However, please note that the first site, Egford, is a Bristol Water PWS site. We hold sampling data for this, but it is not freely in the public domain. In order to release any details, the applicant must first please acquire permission from Bristol Water and forward this to us – see contact details at end.

WIMs ID	Site name	NGR	Site Monitored Aquifer	Datum / Ground level	BH Depth	Construction	Owner
6012GW01	Egford Wells, Frome		Inferior Oolite Group (undivided) and Carboniferous Lst	Not recorded			Bristol Water
6120GW01	St Dunstans Well	ST 65899 47903	Clifton Down Group (undivided)	Not recorded	Spring discharge from cavern.	N/A	Not established
6012GW07	Green Farm, Downhead	ST 68700 45400	Upper Old Red Sandstone Group (undivided)	Not recorded	Not recorded.	Not recorded	Private ownership, farm.

- WFD water bodies status (surface water and groundwater, including status of supporting elements and supporting data/reports. WFD measures for all water bodies which are known to currently be at less than good status.

  This information is available on the Catchment Data Explorer and can be accessed using the following link; https://environment.data.gov.uk/catchment-planning/

Groundwater Sampling and Environment Agency 'Open Data'
The government is trying to improve access to, and transparency of, data that is collected by its departments, including the Environment Agency (EA). This is known as "**Open Data**" which means data that is accessible in digital form and free of restriction on use or redistribution in its licensing conditions. The principle behind this is that publicly-funded data should be publicly available.

Until now, our groundwater quality results have always been available on the public register, meaning that anyone could request the analysis results, though not have access to personal details of the well-owners.

As part of the commitment to Open Data, the public register has now been made available online. The groundwater quality results for the sampling wells on our network are accessible via the website; http://environment.data.gov.uk/water-quality

This will mean that anyone can access the data themselves, and it also means well-owners can check their own results online at any time. Again, personal details are not accessible.

Certain groundwater sampling points and the corresponding data are not available on Open Data. This mostly includes public water supply boreholes belonging to water companies. In order for the EA to release data from those sites, an applicant will first have to gain permission from the water company concerned, and forward to the EA.

To use the Open Data system,

1. Go to the above website, and click on the green 'Explore' square, bottom right.

2. Enter these details:

Sampling point name or ID: SW-6012GW07
(for example. This is what is known as the 'WIMs ID' for the site. WIMs is the EA database where all the hydrochemical data is stored)

EA Area: Wessex

Sampling Point Type: Groundwater

3. Click the green square 'Find sampling points'. This should bring up the name of the well / sampling point

4. Then on the same line, click 'view'. This should bring up the hydrochemical results for this well.

I hope this helps.

Kind regards

[redacted]
Customer & Engagement, Wessex Area
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Direct Dial: [redacted]

From: Douglas, Guy [mailto:guy.douglas@woodplc.com]
Sent: 24 September 2020 13:55
To: Wessex Enquiries [redacted]

Cc: Bennett, Adam [redacted]
Subject: RE: 183174-WX : Whatley and Westdown Quarry - Data Request (EIA/FRA)

Good afternoon,

I spoke to Tash again earlier in response to the query. I look forward to receiving the abstraction information when it becomes available. I called to query what from the permitting side of things are proving problematic? Is what would be more time consuming the part which is information on licenses (quantities, holders etc), and/ or discharge consents? If you clarify that would be much appreciated. I was advised to wait until the abstraction data was received to see what is/ isn't available.

The other thing I wanted to ask about was groundwater level Observation Borehole information. Whilst we do have OBH data from the EA Mendips Study there are areas in our study area which are beyond the extent of that model extent (see attached).
So that all the gw level data is up to date could you process borehole information for the original data search study area please?

Please give me a call on [redacted] if that would be easier,

Kind Regards,
Guy

Guy Douglas
Senior Consultant – Water Management
Direct: +44 (0)141 2221230
www.woodplc.com

From: Wessex Enquiries [redacted]
Sent: 23 September 2020 10:12
To: Douglas, Guy <guy.douglas@woodplc.com>
Subject: RE: 183174-WX : Whatley and Westdown Quarry - Data Request (EIA/FRA)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

183174 WX

Good Morning Guy

I had just read your email this morning when Natasha (Tash) informed that you had called.

Here is an update on the two remaining sections of your enquiry:

We have received the abstraction data and are now reviewing it before sending it to you. We hope to get this done by tomorrow but we will keep you informed.

The permitting part has proved more problematic as the amount of information requested is very large and would involve many hours of work. Because of this, we had to send your request to our National Freedom of Information Advice Team with a time estimate. They have advised that we ask you to reduce the amount of permitting requested, otherwise the request will be deemed manifestly

unreasonable. Perhaps you may be able to reduce the search area? We wait to hear back from you regarding this.

Regards
[redacted]
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Direct dial: [redacted]
Email: [redacted]

From: Douglas, Guy [mailto:guy.douglas@woodplc.com]
Sent: 23 September 2020 09:34
To: Wessex Enquiries <[redacted]
Subject: RE: 183174-WX : Whatley and Westdown Quarry - Data Request (EIA/FRA)

Good morning,

Many thanks for the information which you have sent through to date. As discussed could you provide an update on the status of the items which we have not received anything back on below,

Thanks,
Guy

Guy Douglas
Senior Consultant – Water Management
Direct: +44 (0)141 2221230
www.woodplc.com

From: Wessex Enquiries [redacted]
Sent: 15 September 2020 15:08
To: Douglas, Guy <guy.douglas@woodplc.com>
Subject: 183174-WX : Whatley and Westdown Quarry - Data Request (EIA/FRA)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Mr Douglas, thank you for your enquiry, which we received on 10 August 2020. Please accept our apologies for the delay in sending our response, which was received on 28 August 2020 from our Solent & South Downs area.

We have sent as many of the responses as we can at this time and will send the remaining data/information to you as soon as we receive them. Addition to previous email - **Please see attached letters *183174-WX Letter.pdf* and *183174-WX Letter_P5.pdf* – Data can be downloaded from https://ea.sharefile.com/d-sba88f0b4b364dfb8**

RE: Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental Information Regulations 2004 (EIR)

- Site climate and rainfall data at a location nearest to Whatley/ Westdown inc Rain gauge base data (station ID, station name, location/coordinates, rain gauge type), Daily rainfall records for gauge stations;

  Please see attached file - *183174 Hydrometric data.zip*

- River flow data and river level data for the Whatley Brook, Nunney Brook or River Mells. River and stream flow for all rivers flowing within the Search Area: 1) gauged daily mean flows 2) spot flows 3) annual maxima 4) peak flows 5) gauge station locations and IDs;
  Please see attached file - *183174 Hydrometric data.zip*

- Peak flood levels, depths, flows and velocities from latest available flood models from those watercourses. Flood information, including flood zones, surface water flood risk maps, recorded flood outlines, flood defence and areas gaining benefit from these defences, flood model output (model extent, node locations, flood levels for all return periods, flood extents and floodplain water depth and velocity mapping), and flood modelling reports (as produced for catchment flood management plan purposes, Flood Product 4);

  Please see attached letters *183174-WX Letter.pdf* and *183174-WX Letter_P5.pdf* – Data can be downloaded from https://ea.sharefile.com/d-sba88f0b4b364dfb8
  Please find attached the Defences and Channels Shapefiles for this site, with a corresponding data table - *183174 Defences & Channels Shapefiles.zip* and *183174 Defence Data.pdf*

- Records of historic floods for those watercourses, in particular of interest is the Whatley Brook if applicable;

  Please see attached letters *183174-WX Letter.pdf* and *183174-WX Letter_P5.pdf* – Data can be downloaded from https://ea.sharefile.com/d-sba88f0b4b364dfb8

- Surface water and groundwater abstractions (including known Private Water Supplies), including licences and point name, NGR, source (watercourse/which aquifer), holder, purpose, licensed volume (per point if available), recent actual volume (per point if available), and licence conditions. We also need monthly actual return volumes from the start of the record until the most recent available;

  Surface water and groundwater abstractions data etc to follow as soon as possible

- Surface water and groundwater discharge consents, including number, national grid reference (NGR), discharge water body (watercourse/aquifer), holder, purpose, dry weather flow (DWF, if appropriate), and consent conditions;

  Surface water and groundwater discharge consents data etc to follow as soon as possible

- Hydrogeological groundwater level and other available hydrogeological parameter data. Aquifer designation data (distribution of principal/ secondary aquifers and unproductive strata). Other relevant hydrogeological data you might be aware of e.g. British Geological Survey (BGS) local remapping, local site investigation reports, reports of incidents of groundwater flooding within the search area;

  Hydrogeological groundwater level and other available hydrogeological parameter data - Mendips modelling study – speak to Ellie Creer & Rik Ingram (Wood Plc) who have access to this data already.
  Other relevant hydrogeological data - See DEFRA Magic Map online https://magic.defra.gov.uk/MagicMap.aspx

- Surface water quality data. River and stream quality (chemistry and biological monitoring) data, ideally for the study area, failing that further down the surface water catchment. E.g. chemical and biological (fish, diatoms, macrophytes and invertebrate) monitoring samples for all rivers where available.

  Please see below a link to the Ecology And Fish Data Explorer, where you can extract the ecology data for yourself https://environment.data.gov.uk/ecology-fish/.
  Surface Water Quality data etc to follow as soon as possible

- Also location data of the sampling points (coordinates, water course, sampling point name);
  Location data of the sampling points to follow as soon as possible

- Groundwater quality data. Most recent groundwater Source Protection Zones (SPZs) for any abstraction locations. Groundwater quality data from the superficials and/or the deeper bedrock and (as for water levels) related observation borehole information (OBH name, coordinates, aquifer, datum in mAOD, construction details);

  See DEFRA Magic Map online https://magic.defra.gov.uk/MagicMap.aspx
  The table below lists the boreholes within the Mendips-Whatley catchment from which the EA take routine samples for hydrochemical analysis, as part of the Groundwater Quality Monitoring Network. These boreholes are all in the WFD groundwater body 'G8046 Mendips'.

  The sampling data from these sites can be freely accessed on line using the Open Data system – please see guidance/instructions below on how to access. However, please note that the first site, Egford, is a Bristol Water PWS site. We hold sampling data for this, but it is not freely in the public domain. In order to release any details, the applicant must first please acquire permission from Bristol Water and forward this to us – see contact details at end.

WIMs ID	Site name	NGR	Site Monitored Aquifer	Datum / Ground level	BH Depth	Construction	Owner
6012GW01	Egford Wells, Frome		Inferior Oolite Group (undivided) and Carboniferous Lst	Not recorded			Bristol Water
6120GW01	St Dunstans Well	ST 65899 47903	Clifton Down Group (undivided)	Not recorded	Spring discharge from cavern.	N/A	Not established
6012GW07	Green Farm, Downhead	ST 68700 45400	Upper Old Red Sandstone Group (undivided)	Not recorded	Not recorded.	Not recorded	Private ownership, farm.

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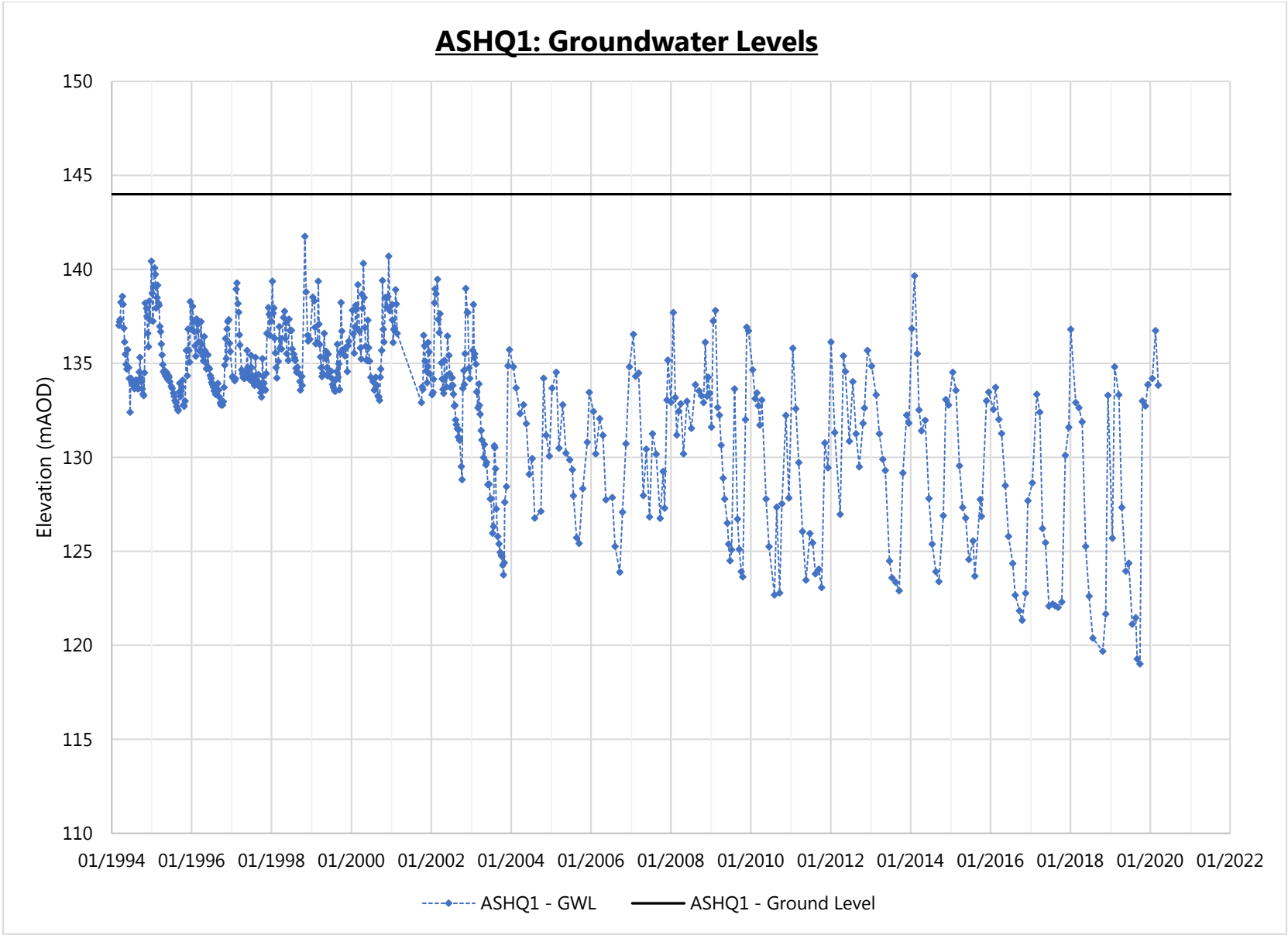
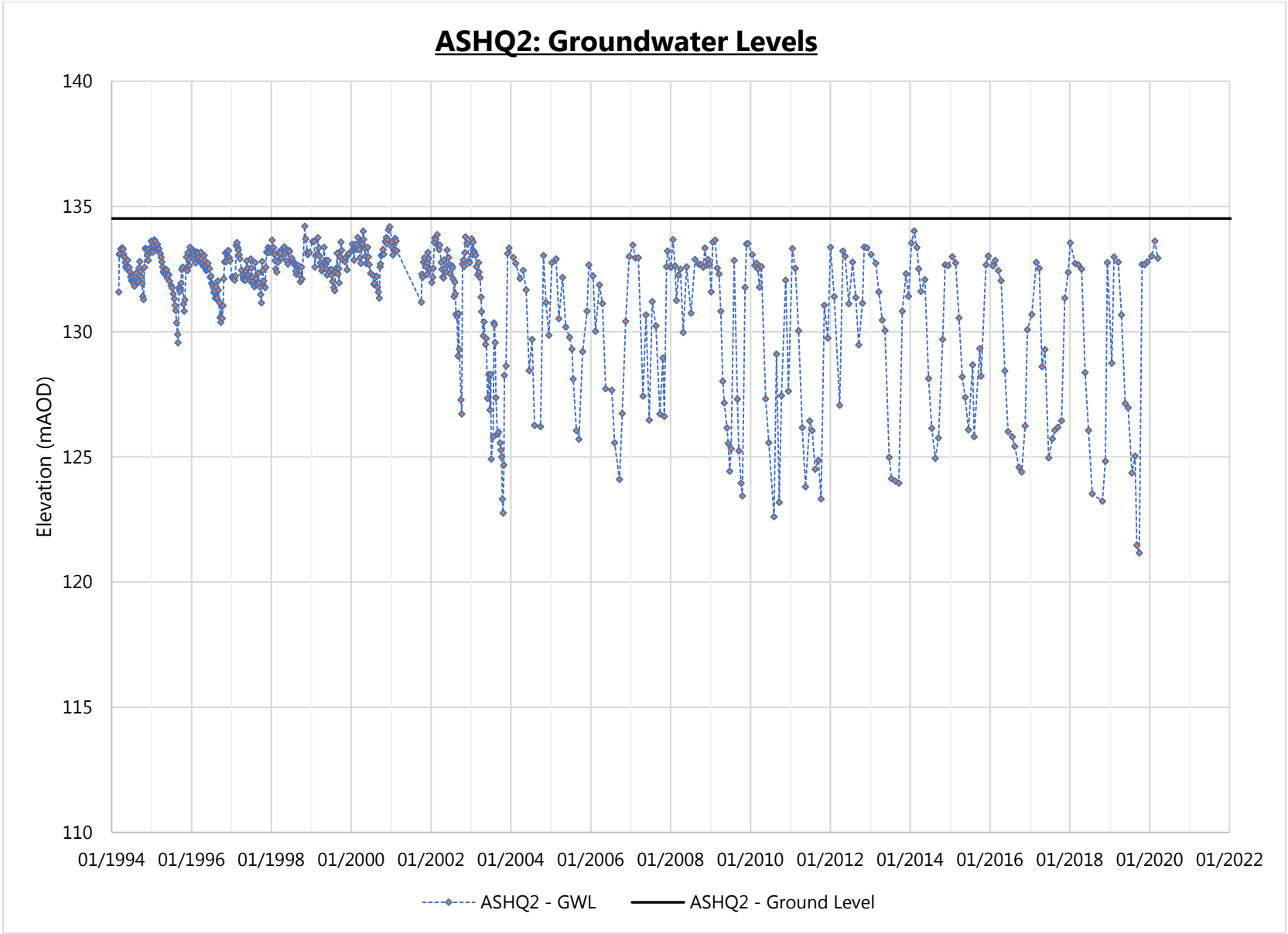
Appendix C
Site photographs and ground level monitoring.


ASHQ1: Groundwater Levels
150
145
140
135
130
125
120
115
110
Elevation (mAOD)
01/1994
01/1996
01/1998
01/2000
01/2002
01/2004
01/2006
01/2008
01/2010
01/2012
01/2014
01/2016
01/2018
01/2020
01/2022
ASHQ1 - GWL
ASHQ1 - Ground Level


ASHQ2: Groundwater Levels
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135
130
125
120
115
110
Elevation (mAOD)
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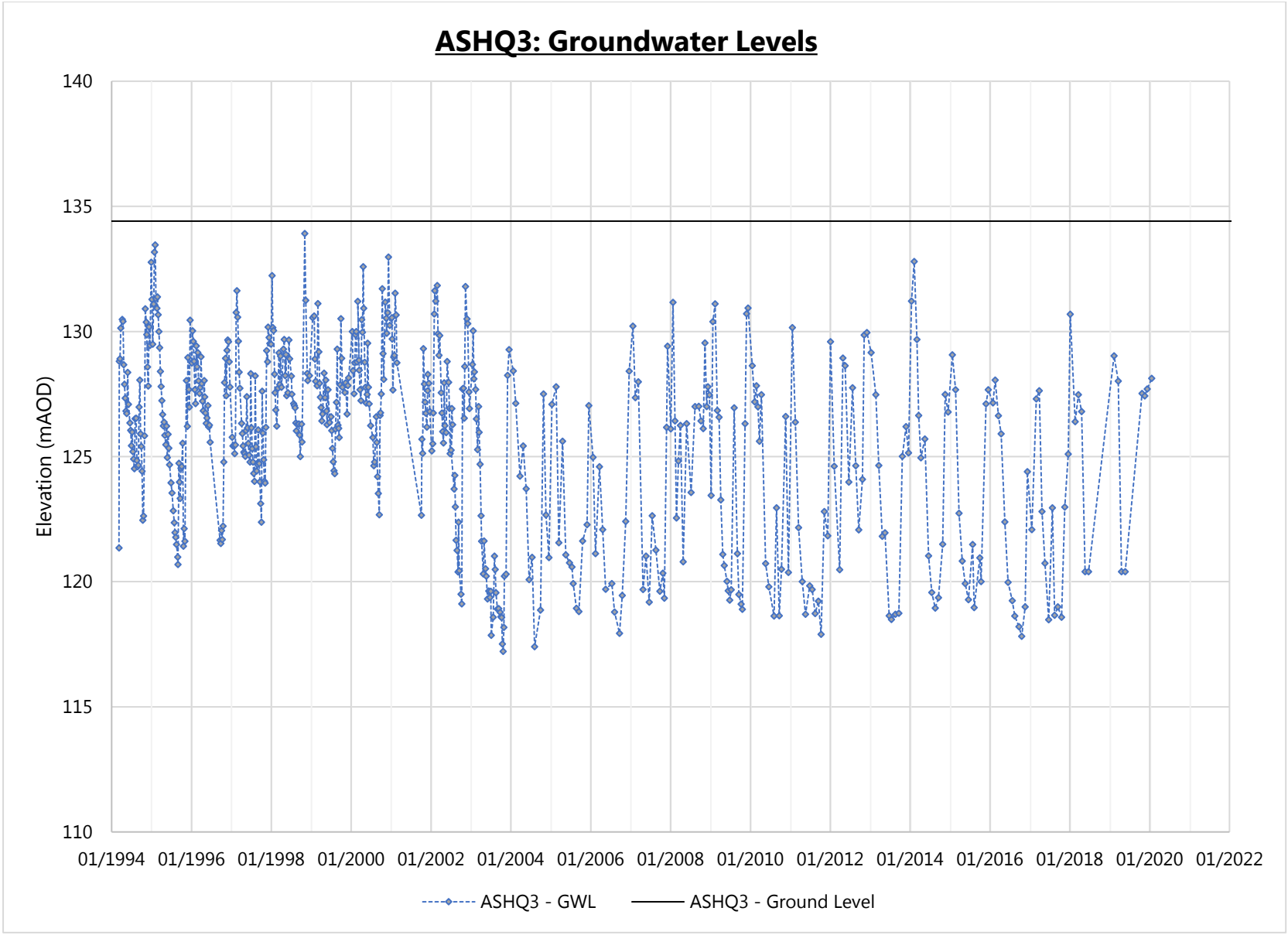
01/1996
01/1998
01/2000
01/2002
01/2004
01/2006
01/2008
01/2010
01/2012
01/2014
01/2016
01/2018
01/2020
01/2022
ASHQ2 - GWL
ASHQ2 - Ground Level


ASHQ3: Groundwater Levels
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135
130
125
120
115
110
Elevation (mAOD)
01/1994
01/1996
01/1998
01/2000
01/2002
01/2004
01/2006
01/2008
01/2010
01/2012
01/2014
01/2016
01/2018
01/2020
01/2022
ASHQ3 - GWL
ASHQ3 - Ground Level

Photos of Whatley Brook within Site Boundary ST7135645631

Photos of Whatley Brook/ Fordbury Water 200m downstream of Site Boundary nr Chantry Pond ST 7169745993

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Appendix D
Site Phasing and Restoration Plans

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Appendix E
WinDES Microdrainage Calculations

Technical note:
Westdown Farm – Surface Water Management

1. Introduction

Potential increases in surface runoff due to excavations and restoration operations at the Westdown Farm Site could increase surface water flood risk. This section provides a review of the SuDS legislation and guidance and estimates the runoff attenuation requirements in the working and restoration phases of the Site so that surface water runoff can be are attenuated to greenfield rates.

1.1 SuDS - Legislation and Guidance

National Planning Policy Framework

The NPPF requires that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development (unless specific off-site arrangements are made and result in the same net effect). Typically, run-off volumes generated during a storm will have to be stored for the duration of the storm and infiltrated to ground or released slowly afterwards to meet the required discharge rate.

The NPPF further advises that planning authorities should promote the use of Sustainable Drainage System (SuDS) principles in the management of surface-water run-off from new developments. There is a presumption for the use of SuDS within any development, except in rare instances that it can be demonstrated that SuDS principles cannot be feasibly be incorporated within a development, as agreed with the planning authority.

Floods and Water Management Act, 2010

Under the Floods and Water Management Act 2010,Somerset County Council (SCC) are designated as the LLFA and therefore act as the 'approving body' for SuDS.

CIRIA SuDS Manual (C753)

The CIRIA SuDS (C753) is the most up-to-date industry standard containing revised principles and technical advice for the planning, design, construction, management and maintenance of effective SuDS. As the LLFA, SCC expect all new or existing developments be designed to align with the revised (C753) manual.

DEFRA Non-statutory technical standards for sustainable drainage systems, 2015

The Non-statutory technical standards for sustainable drainage systems is a national guidance document that provides a set of standards to be applied when designing SuDS systems for any development. Standards include controls on peak flow and volume of run-off and flood risk internal to the development and downstream. Specifically, Standards S7, S8 and S9 state:

- S7 – the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the Site for a 1 in 30 year rainfall event;
- S8 – the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development; and
- S9 – The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

Lead Local Flood Authority Advice

The SCC Minerals SFRA indicates that suitable SuDS strategies should be employed within Sites so that surface water runoff rates are attenuated to greenfield rates[1]. SCC have helped produce SuDS developer guidance (2015) which forms the local standards for Somerset and, together with the National Standards, strongly promotes the use of SuDS which help to reduce surface water runoff and mitigate flood risk.

The LLFA consultation in the Flood Risk Assessment (**Appendix 10A, Annex A**) included some general SuDS requirements for the Site. The requirements are presented in the main Flood Risk Assessment **Section 6**, where the compliance of the proposed measures is confirmed.

1.2 Climate Change

In accordance with LLFA guidance and uplift on rainfall intensities of 40% is to be applied to the 1% AEP event or 100yr return period.

1.3 Software

The modelling for this assessment has been undertaken using the source control module of MicroDrainage Ver 2018.1.1. produce by Innovyze.

2. Modelling of Surface Runoff

2.1 Approach to Calculating Greenfield Runoff

FEH data was used to establish the natural greenfield run rates, as well as being used to generate rainfall for the site. The location of the Site bisects the Fordbury Water and Nunney Brook FEH catchments. The FEH catchment data for the two locations are shown in **Table 2.1** as received from the UK Centre for Ecology and Hydrology FEH Web Services (www.fehweb.ceh.ac.uk).

Due to close proximity of the two catchments only the Nunney Brook FEH data was used to generate rainfall due to it higher SPR HOST value, but generally the amount of rainfall produced was identical for both catchments.

[1] Somerset County Council (2011) Strategic Flood Risk Assessment (SFRA) Minerals and Waste Development Framework

The following other assumptions have also been considered for developing the Greenfield runoff rates:

- FEH 1999 and 2013 was data was obtained but 1999 was used due to compatibility with MicroDrainage's unit hydrograph generation function;
- From the Wallingford Procedure Volume 3 maps, the Fordbury Water and Nunney Brook have soil types of 1 and 3, with a Soil Index Value of 0.15 and 0.40 respective; and
- The region number of the catchment based upon on Figure I.2.4 for the flood studies report (FSR) is 6 for this Site.

Table 2.1 FEH Catchment Data for the Fordbury Water and Nunnery Brook

FEH Parameter	Fordbury Water Catchment	Nunney Brook Catchment
Area	18.57	17.02
SAAR	1078	994
SPR HOST	13.19	37.08
C	-0.02487	-0.02518
D1	0.38496	0.37488
D2	0.357	0.35444
D3	0.32064	0.35004
E	0.29276	0.29395
F	2.52709	2.49363

2.2 Approach to Modelling the Site Runoff

The Westdown Farm site has a number of phases from 1 to 5, plus restoration at two locations the main Westdown Farm site and at the adjacent Asham Wood site.

Worked Phase

The following phasing drawings have been used to establish the worked phase runoff areas:

- Phase 1 - 40380-WOOD-XX-XX-FG-MD-0001_S2_P01;
- Phase 2 - 40380-WOOD-XX-XX-FG-MD-0002_S2_P01;
- Phase 3 - 40380-WOOD-XX-XX-FG-MD-0003_S2_P01;
- Phase 4 - 40380-WOOD-XX-XX-FG-MD-0004_S2_P01; and
- Phase 5 - 40380-WOOD-XX-XX-FG-MD-0005_S2_P01.

It has been assumed that at the worst case, all runoff area will be 100% impermeable, but with varying C_V (Volume Coefficients) values. This represents the amount of rainfall that can be converted to runoff from a specific surface type.

This has been established from current typical values for this soil type and it may range from between 0.63 and 0.92, depend on ground slopes. All surface water bodies are assumed to have a C_V of 1.0. An average value of 0.78 has been assumed for this assessment, which has been applied across all land types. In addition to runoff from the worked location, runoff is expected to contribute from greenfield upslope area. These have been established from topographical data and have been dived into flow from the Fordbury Water and Nunney Brook FEH catchments. These are to be represented in the model via the unit hydrograph method base on the FEH catchment parameters.

The worked areas including the haul roads, bunds and office facilities as well as the anticipated pond size and the connected upslope areas, which have been extracted from the phasing drawings. These areas are summarised in **Table 2.2**.

Table 2.2 Summarised Runoff Areas

Worked Phase	Worked Area (ha)	Storage Mounds (ha)	Haul Roads, Office and Other Facilities (ha)	Total Impermeable Area (ha)	Existing Upslope Run Off- Fordbury Water Catchment (ha)	Existing Upslope Run Off - Nunney Brook Catchment (ha)	Total Runoff Area (ha)
Phase 1	8.8	0.3	1.9	12.0	5.2	4.0	21.1
Phase 2	17.0	0.3	1.9	20.2	5.2	6.0	31.3
Phase 3	27.3	2.3	1.7	32.3	5.2	8.2	45.7
Phase 4	29.3	2.3	1.7	34.3	5.2	9.0	48.5
Phase 5	36.6	3.2	1.7	42.5	5.2	9.4	57.1
All phase anticipated to have a storage pond of approximately 1.0ha							

Restored Scenarios

Following the operation phases the areas will be restored. There are two restoration areas including the main Westdown Farm site, but in additional material from the main site will also be deposited at Asham Wood to the west of the main site. At the main Westdown Farm site, there is anticipated to be progressive restoration which commences during Phase 3. In addition, it is anticipated there will be increase in runoff at Asham Wood as the material being deposit will have a decreased permeability, which may lead to additional runoff being generated. The restoration at Asham Wood runs from Phase 1 to Phase 3.

Westdown Farm

The restoration drawing '40380-WOOD-XX-XX-FG-MD-0006_S2_P01' has been used to establish the restored phase runoff areas, which includes a 27.7ha lagoon. It is anticipated that the restored areas, plus any upslope areas will be intercepted by the proposed lagoon. Attenuation will therefore need to be accommodated in the lagoon, as shown in **Table 2.3**.

Asham Wood

The restoration phase at Asham Wood is shown in the Phase 4 drawing '40380-WOOD-XX-XX-FG-MD-0004_S2_P01'. It is anticipated that the restored areas, plus any upslope areas will still drain to the Fordbury Water as shown in **Table 2.3**. However, it is anticipated that there will be a generally decrease in soil permeability due to relocation of lower permeability overburden from the Nunney Brook FEH catchment to the Fordbury Water FEH catchment.

This is to be accounted for by manually updating the Fordbury Water SPR HOST from 13.15 to 37.08 for the restored area. The additional attenuation required form this SPR HOST increase will need to be accommodated at the lower slopes of Asham Wood.

Table 2.3 Restored Area Runoff Area

Site	Lagoon Area (ha)	Restored Upslope Area (ha)	Existing Upslope Run Off- Fordbury Water Catchment (ha)	Existing Upslope Run Off – Nunney Brook Catchment (ha)	Total Runoff Area (ha
Westdown Farm	27.7	34.8	5.2	5.9	73.6
Asham Wood	1.0[1]	10.4		NA[2]	11.4

1: It is anticipated development will have a storage pond of approximately 1.0ha
2: It is assumed that the development will not affect the existing upslope runoff regime for the Asham Wood site

3. Surface Water Modelling

Existing Site Greenfield Runoff Rate

The calculated Greenfield runoff rates in the unit rates of l/s/ha for the existing site were undertaken using MicroDrainage Ver 2018 and are shown in **Table 3.1**. The ICP (Interim Code of Practice) SUDS methodology has been used to establish these flows.

Table 3.1 Existing Site Greenfield Runoff Rates

Annual Exceedance Probability (%)	Return Period (1 in.....)	Fordbury Catchment Unit GF Runoff (l/s/ha)	Nunney Brook Catchment Unit GF Runoff (l/s/ha)
100	1	0.7	4
3.33	30	1.6	11.6
1	100	2.2	16.3
Q_{BAR}	2.33	0.7	5.1

In line with the LLFA guidance, flows from the site will be restricted to the 1 in 100 year (1% AEP) discharge rates.

It is anticipated that all the surface water flows from the development will be discharged into the Fordbury Water catchment. This is the most practical; route as any discharge to the Nunney Brook will required substantial drainage works to be undertaken across third part land.

The calculation to support the Greenfield runoff rates are shown in **Annex E1**.

3.1 Propose Site Runoff and Attenuation

A conceptual model for each of the operational and restored phases and run with a range of durations from 15 minutes up to 10080 minutes, or 7 days. This is checked to ensure that the critical duration event is included within the analysis.

As requested by the LLFA the half-drain time of any storage structures needs to be less than 24 hours. Since this is unlikely to be achieved due to soil conditions any structure that does not empty sufficient in the allotted time will be subjected to a subsequent storm check. Attenuation will be sized to enable the structure to hold runoff from the critical 1 in 100 year event (including climate change), but also the runoff from a subsequent 1 in 10 year critical after 24 hours of drain down.

The full modelling outputs for the sites are included in **Annex E2**.

Worked Phase

The final attenuation volumes for worked phased are shown in **Table 3.2**. These are the total volumes and could be provided at more than one location across the site as necessary to ensure all parts of the site are served by suitable a drainage system.

Table 3.2 Attenuation Requirements during Working Phase

Worked Phase	Maximum Allowable 1%AEP Discharge Rate (l/s)	Atten Storage Vol at 1% AEP + 40% CC (m^3)	Half Drain Time (hrs)	Critical Duration (mins)	Final Atten Storage Vol at 1% AEP + 40% CC (Inc. subsequent storm check) (m^3)
Phase 1	46.2	16,180	53.6	2880W	17,918
Phase 2	68.4	25,762	54.8	2880W	28,982
Phase 3	99.7	40,405	61.8	2880W	45,078
Phase 4	105.9	43,226	63.2	2880W	48,046
Phase 5	124.6	48,991	60.7	2880W	58,246

Restored Scenarios

Conceptual models were also created to assess the attenuation requirements for the restored phase at both the main Westdown Farm site and the Asham Wood site.

The anticipated attenuation 86,766m^3 volume required at the main Westdown Farm site is to be located within the main 27.7ha lagoon area. The proposed lagoon is to have a typical top water level (TWL) of 120.0m AOD. The theoretic spill level for the proposed lagoon has been estimated to be 139.0m AOD in the northern corner. The result of a 100 year critical event (with 40% CC), plus the subsequent critical 10 year event will result is an additional 0.313m of depth. Therefore, sufficient freeboard is expected within the lagoon to manage the runoff.

Table 3.3 Additional Attenuation Requirements for Restored Scenarios

Catchment	Maximum Allowable 1%AEP Discharge Rate (l/s)	Baseline Attenuation Volume[2] (m3)	Restored Attenuation Volume[2] (m3)	Critical Duration (mins)	Half Drain Time (hrs)	Restoration Attenuation Storage Volume at 1% AEP + 40% CC (m3)[3]
Westdown Farm	160.4	0[1]	59,639	2880W	53.3	68,379
Asham Wood	24.9	3,639	9,756	NA	NA	6,116

1: Due to the change in the drainage regime, all baseline flows will need to be accommodated in the proposed lagoon.
2: Both baseline and restored attenuation volumes have been subjected to a subsequent critical storm check
3: Restoration Attenuation Storage Vol = Restored Attenuation Vol - Baseline Attenuation Vol

3.2 Proposed Site Drainage Infrastructure

In accordance with LLFA guidance, is proposed that any new drainage infrastructure proposed on the Site to manage the runoff to and from the attenuation ponds will be designed to prevent surcharging in all events up to an including the 1 in 2 year storm event. In addition, drainage will be designed to prevent any flooding of the site in all events up to and including the 1 in 30 year storm event, and that all surface water runoff up to the 1 in 100 year event plus 40% climate change will be controlled and retained within the site boundary without causing harm to people or properties.

3.3 Water Quality

The management of the water quality from the site will be undertaken in accordance with CIRIA SUDS Manual C753. In-order to ensure the correct SUDS mitigation measure for this type of development it is anticipated that the primary method for managing water quality will be the SUDS attenuation ponds. However, it expected that this will need to be accompanied by additional SUDS measure such as Swales, Filter drains/catchpits and/or proprietary treatment systems (petrol or oil interceptors) to provide an acceptable level of control.

4. Maintenance

A full maintenance plan is to be developed in due course and will be in accordance with the best practice suggested in the *CIRIA SuDS Manual (C753), Appendix B8*.

For the purpose of this report, maintenance refers to the following:

- Inspection are required to identify performance issues and plan appropriate maintenance needs;
- Operation and maintenance of the drainage system;
- The management of any landscape feature (in relation to SuDS); and
- Waste management associated with any contaminated silt or other products as a result of maintenance.

It is important to ensure that function of the surface water management system is understood by those responsible for maintenance, regardless of whether components are above or below ground. If the system is designed, monitored and maintained in an efficient manner then performance deterioration can usually be minimised.

At this stage, the maintenance plan has been specified to account for the management of the key elements of drainage infrastructure proposed within the site. This plan documents the tasks, frequency and methodology required to ensure that the operation of the surface water management system is maintained at an optimal level of service for current and future uses of the site. This will include both traditional drainage infrastructure and SuDS.

The key pieces of drainage infrastructure identified, which could be utilised at the Site, include:

- Swales;
- Filter drains and catch-pits;
- Pipework (included perforated pipes) and manholes; and,
- Outfalls.

These key maintenance and management activities have been established using the *CIRIA SuDS Manual (C753)* and are held within **Annex E3**.

5. Summary

The surface water management strategy for the Westdown Farm quarrying operation, is as follows:

- Runoff from the operational phases are the development are to be discharged in the Fordbury Water at Greenfield Runoff rates, which has been calculated using the ICP SUDS methodology to be 2.2l/s/ha;
- Climate change for the development is to be a 40% increase in the rainfall intensities;
- All worked area, haul road, storage mounds and office facilities are anticipated to be 100% impermeable, but with a C_V value of 0.78;
- The volume of attenuation required for worked phases range from 17,918m^3 for Phase 1 to 58,191m^3 for Phase 5;
- Post operation and restoration scenario for the main Westdown Farm site will require 86,766m^3 of attenuation, which will be provided within the proposed lagoon. Overburden deposited at Asham Wood will require 6,116m^3 of attenuation, which will need to be provided on the lower slopes of Asham Wood restoration area;

- Water quality and SUDS maintenance plans will also need to be finalised, but it is anticipated that this will include elements such as swale and filter drains, along with the attenuation pond and other traditional drainage infrastructure; and
- Drainage designs will be developed at the detailed design stage, subsequent to gaining planning permission.

Annex E1 Calculation to support the Greenfield runoff rates

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 1078 Urban 0.012
Area (ha) 1.000 Soil 0.150 Region Number Region 6

Results l/s

QBAR Rural 0.7
QBAR Urban 0.7

Q100 years 2.2

Q1 year 0.6
Q30 years 1.6
Q100 years 2.2

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ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 983 Urban 0.008
Area (ha) 1.000 Soil 0.400 Region Number Region 6

Results l/s

QBAR Rural 5.1
QBAR Urban 5.1

Q100 years 16.3

Q1 year 4.4
Q30 years 11.6
Q100 years 16.3

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Annex E2 Modelling Outputs

Summary of Results for Rainfall Profile

Half Drain Time : 1228 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.998	0.998	0.0	24.9	24.9	3630.3	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	13411.6	2656

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m)	99.000	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	1.00
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3639.4	1.000	3639.4

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0218-2490-1000-2490
Design Head (m)	1.000
Design Flow (l/s)	24.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	218
Invert Level (m)	99.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	24.9	Kick-Flo®	0.733	21.5
Flush-Flo™	0.358	24.9	Mean Flow over Head Range	-	20.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.4	1.200	27.2	3.000	42.2	7.000	63.6
0.200	21.5	1.400	29.2	3.500	45.4	7.500	65.8
0.300	24.7	1.600	31.2	4.000	48.5	8.000	67.9
0.400	24.8	1.800	33.0	4.500	51.3	8.500	69.9
0.500	24.4	2.000	34.7	5.000	54.0	9.000	71.9
0.600	23.7	2.200	36.3	5.500	56.6	9.500	73.8
0.800	22.4	2.400	37.9	6.000	59.0		
1.000	24.9	2.600	39.4	6.500	61.3		

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Summary of Results for Rainfall Profile

Half Drain Time : 3312 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.998	0.998	0.0	24.9	24.9	9735.3	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	20252.1	6336

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m)	99.000	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	1.00
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	9755.7	1.000	9755.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0218-2490-1000-2490
Design Head (m)	1.000
Design Flow (l/s)	24.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	218
Invert Level (m)	99.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	24.9	Kick-Flo®	0.733	21.5
Flush-Flo™	0.358	24.9	Mean Flow over Head Range	-	20.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.4	1.200	27.2	3.000	42.2	7.000	63.6
0.200	21.5	1.400	29.2	3.500	45.4	7.500	65.8
0.300	24.7	1.600	31.2	4.000	48.5	8.000	67.9
0.400	24.8	1.800	33.0	4.500	51.3	8.500	69.9
0.500	24.4	2.000	34.7	5.000	54.0	9.000	71.9
0.600	23.7	2.200	36.3	5.500	56.6	9.500	73.8
0.800	22.4	2.400	37.9	6.000	59.0		
1.000	24.9	2.600	39.4	6.500	61.3		

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Summary of Results for Rainfall Profile

Half Drain Time : 3677 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.999	3.999	0.0	160.5	160.5	68356.5	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	132404.7	6256

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	17094.8	4.000	17094.8

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0440-1605-4000-1605
Design Head (m)	4.000
Design Flow (l/s)	160.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	440
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	160.2	Kick-Flo®	2.514	127.8
Flush-Flo™	1.167	160.5	Mean Flow over Head Range	-	139.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	11.7	1.200	160.4	3.000	139.2	7.000	210.6
0.200	42.3	1.400	159.5	3.500	150.1	7.500	217.8
0.300	83.7	1.600	157.6	4.000	160.2	8.000	224.8
0.400	123.8	1.800	154.9	4.500	169.7	8.500	231.6
0.500	142.8	2.000	150.9	5.000	178.6	9.000	238.2
0.600	149.0	2.200	144.8	5.500	187.2	9.500	244.6
0.800	156.5	2.400	135.3	6.000	195.3		
1.000	159.8	2.600	129.9	6.500	203.1		

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Summary of Results for Rainfall Profile

Half Drain Time : 3576 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.996	3.996	0.0	46.2	46.2	17900.1	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	35581.7	6176

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	4479.4	2.000	4479.4	4.000	4479.4
1.000	4479.4	3.000	4479.4		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0242-4620-4000-4620
Design Head (m)	4.000
Design Flow (l/s)	46.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	242
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	46.2	Kick-Flo®	2.164	34.4
Flush-Flo™	1.047	44.2	Mean Flow over Head Range	-	39.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.9	1.200	44.0	3.000	40.2	7.000	60.6
0.200	24.6	1.400	43.4	3.500	43.3	7.500	62.6
0.300	34.8	1.600	42.3	4.000	46.2	8.000	64.6
0.400	38.0	1.800	40.6	4.500	48.9	8.500	66.5
0.500	40.3	2.000	37.8	5.000	51.5	9.000	68.4
0.600	41.9	2.200	34.6	5.500	53.9	9.500	70.2
0.800	43.6	2.400	36.1	6.000	56.2		
1.000	44.2	2.600	37.5	6.500	58.4		

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Summary of Results for Rainfall Profile

Half Drain Time : 3688 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.998	3.998	0.0	68.4	68.4	28967.6	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	54316.4	6176

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	7245.4	2.000	7245.4	4.000	7245.4
1.000	7245.4	3.000	7245.4		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0294-6850-4000-6850
Design Head (m)	4.000
Design Flow (l/s)	68.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	294
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	68.4	Kick-Flo®	2.388	53.3
Flush-Flo™	1.142	68.4	Mean Flow over Head Range	-	59.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	1.200	68.4	3.000	59.5	7.000	89.7
0.200	30.3	1.400	67.9	3.500	64.1	7.500	92.8
0.300	50.8	1.600	66.8	4.000	68.4	8.000	95.8
0.400	57.4	1.800	65.2	4.500	72.4	8.500	98.6
0.500	61.1	2.000	62.6	5.000	76.2	9.000	101.4
0.600	63.7	2.200	58.8	5.500	79.8	9.500	104.1
0.800	66.9	2.400	53.4	6.000	83.3		
1.000	68.2	2.600	55.5	6.500	86.6		

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Summary of Results for Rainfall Profile

Half Drain Time : 3966 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.998	3.998	0.0	99.7	99.7	45052.1	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	80775.1	6160

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	11269.5	2.000	11269.5	4.000	11269.5
1.000	11269.5	3.000	11269.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0352-9980-4000-9980
Design Head (m)	4.000
Design Flow (l/s)	99.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	352
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	99.7	Kick-Flo®	2.413	78.0
Flush-Flo™	1.135	99.7	Mean Flow over Head Range	-	86.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.2	1.200	99.6	3.000	86.7	7.000	131.0
0.200	35.6	1.400	98.8	3.500	93.5	7.500	135.4
0.300	65.6	1.600	97.4	4.000	99.7	8.000	139.8
0.400	83.8	1.800	95.1	4.500	105.6	8.500	144.0
0.500	89.1	2.000	91.8	5.000	111.2	9.000	148.1
0.600	93.0	2.200	86.6	5.500	116.4	9.500	152.0
0.800	97.5	2.400	78.8	6.000	121.5		
1.000	99.4	2.600	80.9	6.500	126.3		

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Summary of Results for Rainfall Profile

Half Drain Time : 3987 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.998	3.998	0.0	105.9	105.9	48019.5	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	85882.7	6176

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	12011.6	2.000	12011.6	4.000	12011.6
1.000	12011.6	3.000	12011.6		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0362-1059-4000-1059
Design Head (m)	4.000
Design Flow (l/s)	105.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	362
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	105.9	Kick-Flo®	2.410	82.8
Flush-Flo™	1.128	105.7	Mean Flow over Head Range	-	91.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.4	1.200	105.6	3.000	92.1	7.000	139.1
0.200	36.4	1.400	104.8	3.500	99.2	7.500	143.9
0.300	68.0	1.600	103.2	4.000	105.9	8.000	148.5
0.400	89.1	1.800	100.8	4.500	112.1	8.500	152.9
0.500	94.7	2.000	97.3	5.000	118.1	9.000	157.3
0.600	98.7	2.200	91.8	5.500	123.7	9.500	161.5
0.800	103.5	2.400	83.5	6.000	129.0		
1.000	105.4	2.600	85.9	6.500	134.2		

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Summary of Results for Rainfall Profile

Half Drain Time : 4051 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
Rainfall Profile	99.997	3.997	0.0	124.4	124.4	58209.9	O K

Storm Event	Duration (mins)	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
Rainfall Profile	6392	2.274	0.0	101910.0	6160

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Model Details

Storage is Online Cover Level (m) 100.000

Infiltration Basin Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	14561.6	2.000	14561.6	4.000	14561.6
1.000	14561.6	3.000	14561.6		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0391-1246-4000-1246
Design Head (m)	4.000
Design Flow (l/s)	124.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	391
Invert Level (m)	96.000
Minimum Outlet Pipe Diameter (mm)	Site Specific Design (Contact Hydro International)
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	124.5	Kick-Flo®	2.455	98.2
Flush-Flo™	1.147	124.4	Mean Flow over Head Range	-	108.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.9	1.200	124.4	3.000	108.2	7.000	163.6
0.200	38.7	1.400	123.6	3.500	116.6	7.500	169.2
0.300	74.3	1.600	121.9	4.000	124.5	8.000	174.6
0.400	104.5	1.800	119.4	4.500	131.8	8.500	179.8
0.500	111.1	2.000	115.7	5.000	138.8	9.000	184.9
0.600	115.9	2.200	110.1	5.500	145.4	9.500	189.9
0.800	121.6	2.400	101.4	6.000	151.7		
1.000	124.0	2.600	101.0	6.500	157.7		

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Annex E3 Management and Maintenance Plan

Item	Maintenance Activity	Frequency
Detention Basin and Ponds	Remove litter and debris, Inspect inlets for blockages and clear if required, inspect bankside structures, pipework etc. for evidence of physical damage, cut grass – for spillways and access routes, manage other vegetation and remove nuisance plants	Monthly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Cut grass – meadow grass in and around basin	Six monthly
	Tidy all dead growth before growing season, manage wetland plants in outlet pool – where provided	Annually
	Prune and trim any trees and remove cuttings	2 years or as required
	Remove sediment from inlets and forebay	5 years or as required
	Repair erosion or other damage by reseeding or re-turfing, realignment of rip-rap, repair/rehabilitation of inlets, relevel uneven surface and reinstate design levels	As required
Swales	Remove litter and debris.	Monthly (or as required)
	Cut grass – to retain grass height within specified design range	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.	Monthly (or as required)
	Inspect vegetation coverage.	Monthly for 6 months quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Six monthly
	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.	As required or if bare soil is exposed over 10% or more of the swale treatment area
	Repair erosion or other damage by re-turfing or reseeding.	As required
	Relevel uneven surfaces and reinstate design levels.	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface.	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practises.	As required
Filter Drains & Catch-pits	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies.	Six monthly
	Remove sediment from pre-treatment devices.	Six monthly, or as required
	Remove or control roots where they are encroaching the sides of the filter drain, using recommended methods.	As required
	At locations with high pollution loads, remove geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required
	Clear perforated pipework of blockages.	As required
Pipework and Manholes	Clear pipework of blockages.	As required
	Inspect drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
Outfalls	Remove litter and debris and inspect for sediment.	Six monthly, or as required
	Inspect for evidence of poor operation.	Six monthly
	Inspect waste accumulation rates and establish appropriate removal frequencies.	Six monthly
Proprietary Treatment Systems (Petrol/Oil Interceptor)	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Six monthly
	Change the filter media.	As recommended by the manufacturer
	Remove sediment, oil, grease and floatables.	As necessary – indicated by system inspections or following a significant spill
	Replace malfunctioning parts or structures.	As required
	Inspect for evidence of poor operation.	Six monthly
	Inspect filter media and establish appropriate replacement frequencies.	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies.	Monthly during first half year of operation, then every six months

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