



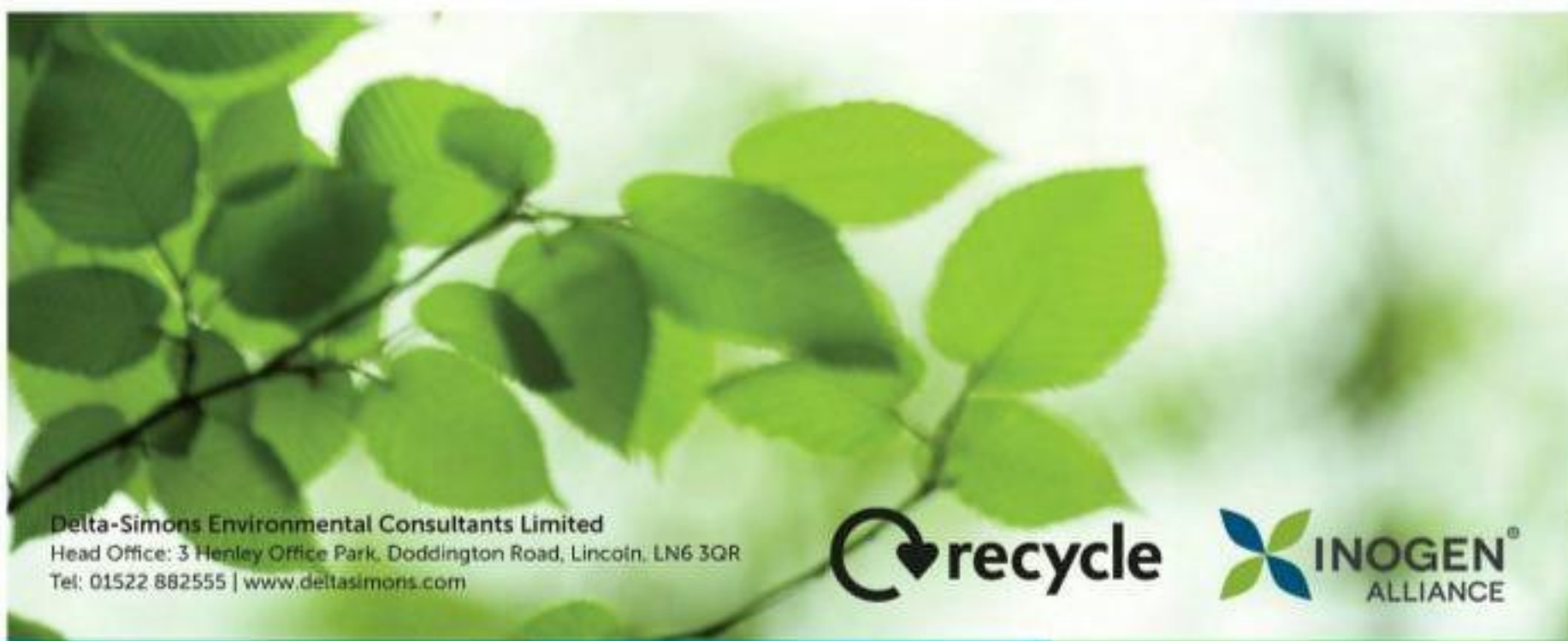
Preliminary Geo-Environmental Risk Assessment

Brockhampton West, Harts Farm Way, Havant, Hampshire

Presented to **Clowes Developments (UK) Ltd**

Issued: February 2021

Delta-Simons Project No. 19-2099.01



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Report Details

Client	Clowes Developments (UK) Ltd
Report Title	Preliminary Geo-Environmental Risk Assessment
Site Address	Brockhampton West, Harts Farm Way, Havant, Hampshire
Project No.	19-2099.01
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
2	Second Client Issue	15 th February 2021	-			
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Executive Summary

Brief	Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Exton Estates on behalf of Clowes Developments (UK) Ltd (the "Client") to prepare a Preliminary (Geo-Environmental) Risk Assessment to support a planning application for a proposed B2/B8 development (the 'Proposed Development') at the site known as Brockhampton West, Harts Farm Way in Havant, Hampshire (the 'Site').
Site Use & Surrounding Area	The Site is currently an unoccupied parcel of grassland that previously was part of a wider landfill Site, with limited areas of hardstanding in the centre. The Site includes a small access road branching from Harts Farm Way along the southern Site boundary. Unoccupied fields and parks occupy much of the surrounding area with Storehouse Lake towards the south and Langstone Technology Park towards the west. The Havant Bypass (A27) trends along the northern boundary.
Environmental Setting	The Site is likely underlain by a sequence of placed topsoil, re-engineered clay cover, significant thicknesses of Made Ground associated with historically landfilled waste, predominantly Raised Marine superficial deposits (classified as a Secondary – Undifferentiated Aquifer), and bedrock of the Lewes Nodular Chalk Formation (Principal Aquifer). The nearest surface water feature is Hermitage Stream that flows along the eastern boundary of the Site and flows into Storehouse Lake (Langstone Harbour). Langstone Harbour is a site of significant ecological importance including a Natura 2000 site, Ramsar Site, a Site of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC) and a Special Protection Area (SPA). Sites designated as such are protected by UK law and will require further consideration as part of the assessment of risk associated with the former landfill and in context of the proposed development.
Contamination Potential Sources	Potential sources of contamination have been identified at the Site, specifically the historical landfill site. These areas encompass the majority of the Site as well as much of the immediate surrounding area towards the west and south. The landfill is known to be a domestic unlined tip with key risk drivers being production of leachate with elevated ammonium / metals and ground gas. There is also potential for unknown / localised sources of other contamination including asbestos within the waste mass. The landfill may be adversely impacting nearby ecological receptors, specifically Langstone Harbour, Hermitage Stream (adjacent) and the future Site users/buildings.
Contaminated Land Risk Associated with Ownership	There is considered to be a Low to Moderate risk of enforcement action by the regulatory authorities under Part 2A of the Environmental Protection Act 1990, the Environmental Permitting (England and Wales) Regulations 2016 or the Environmental Damage Regulations 2015. The potential for legal action by surrounding landowners / Third Parties based on the potential for contamination to migrate off-Site (ongoing or historically) and result in private or statutory nuisance is considered to be Low to Moderate .
Development Considerations	Widespread contamination is considered likely and the preliminary risk assessment has identified a Moderate to High risk of soil/groundwater contamination and hazardous ground gas at the Site. Asbestos is likely present within the landfill Made Ground deposits. Soils/materials associated with the existing cover will require physical and chemical characterisation prior to re-use. Landscaped areas in the development may require the import of clean cover. A key risk driver is the impact on the Site to controlled waters, specifically, Langstone Harbour, Hermitage Stream and to a lesser extent the underlying Chalk aquifer which is acknowledged by the Environment Agency (EA) to be acting as a pathway rather than a receptor. Whilst reduced infiltration rates into the landfill waste as a result of the

	development will likely occur, and dependant on the pending investigation/risk assessments, remedial work in this regard might be required. Whilst further detailed assessment work and potential mitigation measures are required, at this stage it is considered unlikely that there will be significant impacts to human health or the wider environment arising from the development proposals. Furthermore, it is considered that following development, in line with recommendations for mitigation and the significant reduction in overall permeability of the Site due to hardstanding, clean cover and a formal drainage system, that a likely reduction in the leachate generation potential of the Site will occur. Based on this it is considered that there will be an overall betterment in respect of existing groundwater risks to the aquifer and more importantly to the adjacent Hermitage Stream and Langstone Harbour beyond. Based on the historic landfill and likely significant ground gas generation potential the installation of ground gas protection measures is considered likely to be required within the proposed buildings to mitigate risks of explosion/asphyxiation. The underlying ground conditions at the Site, most notably the deep fill material, are likely to pose a risk to any shallow foundations of the proposed development due to differential and total settlement issues. As such it would be prudent to allow for the foundations to be piled into the Chalk bedrock. External areas may also require mitigation against settlement due to the waste. Based on prior consultation with the EA there is no specific current acceptable mechanism to disturb and reuse waste materials within the development using the Definition of Waste Code of Practice (DoWCoP) and Materials Management Plan (MMP). Whilst a potential route utilising an Environmental Permit might be an option moving forward to reuse waste materials, this is likely to involve significant programme and cost risks. It would be prudent therefore to allow for off-Site disposal for waste materials that are part of the anticipated cut to form the development platform. Shallow groundwater may also present difficulties with shallow excavations.
Recommendations	In relation to the Site, the following recommendations have been made: ▲ An intrusive ground investigation be undertaken to investigate the nature and thickness of the Made Ground; the presence, concentrations and leachability of substances of concern in terms of risk to human health, controlled water and the ecological receptors; likelihood of significant ground gas and/or soil vapour intrusion into future buildings structures; and a geotechnical assessment to aid the design of foundations and engineering solutions. ▲ Additional sampling, laboratory analysis and waste classification may be required for any soils required to be disposed of off-Site; ▲ A Materials Management Plan (MMP) will be required, should non waste materials be proposed for reuse on-Site; ▲ A piling risk assessment will be required to ensure risks to controlled water are managed appropriately; and ▲ A Remedial Strategy is likely to be required to be prepared. Consultation with the relevant regulatory authorities to agree the scope of the ground investigation is being undertaken at the present time and all other aspects of the project will require consultation and approval with these relevant bodies.
This is intended as a summary only. Further detail and the limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Exton Estates on behalf of Clowes Developments (UK) Ltd (the "Client") to prepare a Preliminary (Geo-Environmental) Risk Assessment to support a planning application for a proposed B2/B8 development (the 'Proposed Development') at the site known as Brockhampton West, Harts Farm Way, Havant, Hampshire (the 'Site').

1.2 Context & Purpose

The proposed use for the Site is the development of new employment units to provide up to 29,000 m² (gross internal area) for flexible use across use classes E (light industrial), B2 and B8 with ancillary offices, car parking, service yards, drainage works, landscaping and associated works to prepare the site for development. Whilst the form of the proposed buildings has not yet been defined, three preliminary illustrative layouts will be submitted as part of the outline planning application for the Site for one, two and three unit schemes.

The aim of this report is to support the submission of a planning application for the proposed development. To that end this study assesses the likely environmental and geotechnical issues associated with soil and groundwater conditions that may affect the proposed development of the Site. This report is designed in general accordance with guidance on Land Contamination: Risk Management pages of the [GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf) web pages, the relevant requirements of the National Planning Policy Framework 2019 (NPPF) (paragraphs 170 & 178-180)¹ and the Planning Practice Guidance (Land Affected by Contamination)².

1.3 Scope of Works

- ▲ Review of the environmental setting of the Site, including the current use / status of the Site and surrounding area, and review of the geology, hydrogeology and hydrology;
- ▲ Review of the historical activities of the Site and surrounding area;
- ▲ Review of regulatory information relating to the Site;
- ▲ Review of the online planning records for the Site;
- ▲ Consult and review information from the Local Authority in relation to Part 2A of the 1990 Environmental Protection Act;
- ▲ Complete a Site reconnaissance by undertaking a visual inspection of readily accessible areas of the Site;
- ▲ Review of provided relevant third party reports relating to the Site or surrounding area;
- ▲ Develop an outline Conceptual Site Model and undertake a Preliminary Risk Assessment with respect to potential contamination focussed on the proposed land use;
- ▲ Identify potential contamination risks and / or liabilities associated with the proposed acquisition of the Site;
- ▲ Provide commentary on potential land contamination and geotechnical constraints in the context of the proposed development; and,

In completing this Assessment, Delta-Simons has utilised the following data sources and third party information:

- ▲ Current and Historical Ordnance Survey (OS) maps;
- ▲ British Geological Survey (BGS) data;
- ▲ Environment Agency (EA) online data;
- ▲ Coal Authority (CA) online data;
- ▲ A Landmark Envirocheck Report for the Site (Ref. 271595310_1_1), dated January 2021;
- ▲ Historical Maps included as part of the Envirocheck Report; and

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

² <https://www.gov.uk/guidance/land-affected-by-contamination>

- ▲ Information provided by Havant Borough Council.

1.4 Limitations

The standard limitations associated with this assessment are presented in Appendix A. In addition, there are the following specific limitations that apply to this assessment:

- ▲ The Consultant undertaking the Site inspection will observe for evidence of invasive species, particularly Japanese Knotweed. It should be noted however that the Consultant is not a trained ecologist and a separate survey undertaken by an experienced Ecologist should be completed to provide a robust assessment;
- ▲ The report includes a preliminary assessment for the potential for radon gas hazards. A detailed radon assessment falls outside of the scope of this report, and the requirement for radon mitigation measures in the proposed development should be identified separately to the satisfaction of Havant Borough Council Building Control;
- ▲ The report is not considered to be comprehensive assessment of compliance with waste legislation and further work and consultation with the Environment Agency will be required to enable a route forward on the reuse of the cover material and potentially waste materials within the cut & fill scheme; and
- ▲ Commentary has been provided regarding existing Site services in the context of assessing environmental and geotechnical issues, however a detailed review of all overhead or underground services is outside the scope of this assessment.

2.0 Site Context & Data Review

2.1 Site information

  Figure 1: Contains OS data ©, Crown Copyright and Database Right (2016)		  Figure 2: Contains OS data ©, Crown Copyright and Database Right (2016) Contains Data from, © 2015 Landmark Information Group Ltd © OpenStreetMap contributors	
Site Location		Site Layout	
Co-ordinates	Centred approximately at National Grid Reference 470150, 105700.	Elevation	3.0 – 9.0 m AOD
		Area	8.3 Ha
Site Location	The Site is located to the south of the Havant Bypass (A27) towards the western outskirts of Havant, approximately 7.0 km northeast of Portsmouth.		
Current Site Use	The Site is currently an unoccupied parcel of grassland that previously was part of a wider landfill Site with limited areas of hardstanding in the centre. The Site comprises a small access road branching from Harts Farm Way along the southern Site boundary. The Site is occupied by trees and shrubs along the perimeters. Whilst the Site is private land it is evident on aerial photographs that the Site is used by the public for dog walking.		
Proposed Development Description	The proposed use for the Site is the development of new employment units to provide up to 29,000 m² (gross internal area) for flexible use across use Classes E (light industrial), B2 and B8 with ancillary offices, car parking, service yards, drainage works, landscaping and associated works to prepare the Site for development. Whilst the form of the proposed buildings has not yet been defined, three preliminary illustrative layouts will be submitted with the outline planning application demonstrating use of the site for one, two and three unit schemes. The final proposed developed design is intended to be agreed under Reserved Matters planning consent.		

	Hardstanding areas to facilitate carparking are proposed to be situated around the buildings with areas of soft landscaping towards the perimeter of the Site. Entrance to the Site will be via Harts Farm Way with ease of access to the heavy goods vehicle (HGV) docking stations. It understood that a significant cut and fill operation may be required to facilitate the proposed units. Sketches of the development proposals are presented in Appendix B.	
Site Reconnaissance	Delta-Simons conducted a Site visit on 13th January 2021. A series of Site photographs are presented as Appendix C, and pertinent information that was observed or reported on-Site is summarised as follows: ▲ The entrance to the Site is located off Harts Farm Way and comprises a concrete access road that continues north into the centre of the Site; ▲ Access to the Site via the access road in the south is inhibited by concrete blocks and a locked gate (Photograph 1). Pedestrian access is available in the west, north-west, north-east and east of the Site though signage indicates unauthorised access is prohibited. Well-worn paths are visible crossing the entire Site from these access points with a suspected birdwatcher observed during the Site reconnaissance visit; ▲ Besides the access road, the Site is entirely covered in vegetation with denser vegetation including young and mature trees located around the perimeter of the Site, the south and also the centre of the Site (Photograph 2); ▲ Topographically the Site is varied, the western half and the eastern half of the Site form two 'domes' with the western 'dome' being less steeply inclined and generally lower than the eastern 'dome' (Photograph 3). The lowest points of the Site appear to be the access road in the centre and south and the perimeters of the Site; ▲ Waste was observed near the entrance to the Site in the south comprising black refuse bags (contents unknown), plastic waste and wooden planks (Photograph 4). Large wheelie bins, an overturned portable toilet and household waste including black refuse bags (content unknown), empty food containers, empty animal food bags and other various plastic / paper waste was situated within the vicinity of the hardstanding in the south and centre of the Site (Photograph 5); ▲ The north of the Site was bound by dense vegetation, the east by Hermitage Stream and footpath that is accessible from the Site (Photograph 6), the south by Harts Farm Way and the west by vegetation and Harts Farm Way. In the north-east of the Site, a well-worn footpath through some dense mature trees leads to a bridge allowing pedestrian access over the A27; ▲ The Site is noticeably higher than its immediate surroundings with the angle of slope varying around the perimeter (Photograph 7); and ▲ There is evidence of previous intrusive investigation including monitoring well headworks (generally in good condition) and trial pitting scars. The Client also conducted a Site walkover in January 2021 and provided Delta Simons with photographs that demonstrate the following: ▲ The sheet pile wall structure on the eastern periphery of the Site at the interface with Hermitage Stream (photographs 9 & 10); and ▲ Discharge/outfall into Hermitage Stream from the Site (photograph 8)	
	Beyond the fly-tipped waste identified on Site, no further potential sources of contamination were identified during the Site visit.	
Current Surrounding Area	North	The Havant Bypass (A27) trends along the northern boundary with agricultural fields beyond.

	East	Hermitage stream flows along the eastern boundary with a Langstone Technology Park beyond. The park includes a sewage works, household waste recycling centre and a buildings materials supplier.
	South	Unoccupied fields and Broadmarsh Coastal Park with associated car park, Chalkdock Lake and Storehouse Lake are present beyond.
	West	Teardrop junction linked with the Havant Bypass with unoccupied fields beyond.

2.2 Environmental Setting

Published Geology	From published British Geological Survey (BGS) mapping (1:50,000), the Site is indicated as being underlain by superficial Raised Marine Deposits comprising sand and gravel. Potential River Terrace and Tidal Flat Deposits are indicated to be encroaching onto the north and north-eastern part of the Site. The underlying bedrock is indicated to be the Lewes Nodular Chalk Formation. Given the history of the Site, Made Ground is likely to be present from shallow ground levels, overlying the superficial deposits.
Specific Ground Conditions	One nearby log (from BGS mapping data) belonging to C. Isler & Co. Ltd., thought to be associated with the development of the A27 Havant Bypass located north of the Site (Ref. SU70NW248), records drift deposits to a maximum depth of approximately 4.5 m below ground level (bgl). Groundwater was indicated at a depth of 2.5 m bgl. The log records Chalk from 4.5 m to the end of the hole (15.25 m bgl). No BGS boreholes are indicated to exist at the Site. Specific Ground conditions drawn from third-party investigations are outlined in Section 2.6.
Hydrogeology	The EA classify the superficial Raised Marine Deposits as a Secondary – Undifferentiated Aquifer, and the bedrock (Chalk) as a Principal Aquifer. Minor superficial deposits (River Terrace and Tidal Flat Deposits) encroaching onto the northern part of the Site are classified as Secondary A Aquifers. The EA data also indicates that the Site is not in a designated groundwater Source Protection Zone. According to the Envirocheck Report, the nearest licensed abstraction record from groundwater is a 'Public Water Supply: Potable Water Supply' located 420 m northeast of the Site, operated by Portsmouth Water Ltd. The available BGS borehole information did not indicate the presence of any groundwater specifically at the Site, however, shallow groundwater (<2.5 m bgl) was recorded in nearby historical logs. A third-party Site investigation (WYG, August 2017) recorded groundwater strikes in both landfill and superficial strata at depths ranging between 3.9 and 11.5 m bgl.
Hydrology	The nearest surface water feature is the Hermitage Stream that flows along the eastern boundary of the Site and flows into Storehouse Lake. Based on the Site reconnaissance this is to the east of the Site (beyond a public footpath) and is formed by sheet pile wall and concrete headworks structure. It is not known what depth the sheet pile wall extends to, but it is considered likely that the structure was keyed into the underlying Chalk bedrock. According to the Envirocheck Report, there are no licensed abstraction records from surface water located within 1 km of the Site.
Coal Mining	Reference to the Coal Authority on-line viewer indicates that the Site is not within a Coal Mining Reporting Area and is not within a Development High Risk Area.

	Consequently, a Coal Mining Risk Assessment (CMRA) is unlikely to be required under the planning regime.
Radon Gas	The Site lies within an area where less than 1% of homes are above the National Radiological Protection Board (NRPB) recommended "action level" for radon. BRE211 (2015) indicates that no radon protective measures are necessary in the construction of new buildings at the Site.
Ecological Receptors	It is understood from information provided within the Envirocheck® Report, that the Site is located within a Nitrate Vulnerable Zone. Within 200 m south of the Site, Langstone Harbour and Solent Maritime is denoted a Ramsar Site, a Site of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC), a Special Protection Area (SPA) and Natura 2000 Site..
Heritage Interest	According to sketchmap.co.uk , the closest area of heritage interest is located approximately 200 m to the north-east of the Site associated with a Grade II Listed Building. No further areas of heritage are located within 500 m of the Site.
Environmental Sensitivity	The Site is considered to be of a high environmental sensitivity given the presence of semi-permeable superficial strata overlying the relatively shallow Principal Aquifer, close proximity of Langstone Harbour (which has a number of ecological designations) and the adjacent stream.

2.3 Historical Use of the Site & Surrounding Area

Approach	The historical development of the Site and surrounding area has been assessed through a review of historical OS maps provided within the Envirocheck report and online historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Copies of pertinent historical maps are included as Appendix D.
Historical Features On-Site	From the earliest reviewed mapping dated 1868, the western part of the Site comprises 'Broad Marsh' with muddy wetlands towards the east. A small stream feeding into 'Storehouse Lake' enters at the north-eastern corner of the Site and leaves at the deltaic flatlands towards the southern boundary. There is an unidentified building (later identified as part of a Quay) in the north east of the Site. The building is no longer evident by 1969. The mean high water level is indicated to be in the centre of the Site on the 1952 maps. The Site maintains this natural layout until 1973. By this time the stream feeding into Storehouse Lake has been diverted to the east and is now identified as Hermitage Stream. The Site has been subject to significant earthworks (including the known tipping of wastes) to form the headland which extends to south. The 1987 map indicates a now retreated mean high water level and the Site is currently marked as 'Playing Fields'. 'Broad Marsh' is still indicated towards the western boundary of the Site. Online aerial imagery from 1999 indicates the western half of the Site has been subject to re-engineering/earthworks, potentially comprising the re-shaping of the landfill cap in this section of the Site. These works were completed by 2004. Further groundworks are evident on the 2007 aerial photograph in the south eastern and central area of the Site which is likely attributed to significant re-modelling of the tear drop junction to the east of the Site. It is clear from the aerial photographs the Site has not been used for playing fields since sometime prior to 1999.

Potentially Contaminative Historical Features Off-Site	Potential sources of contamination within 250 m of the Site include: ▲ A Sewage Works (Havant R.D. Council) indicated on the 1932 and 1938 maps is located 100 m north of the Site. The associated now disused tanks are indicated on subsequent mapping until the present day; however, this is likely to have been disused since the 1960s based on the historical mapping. ▲ The 1966 maps indicate the addition of the Havant Bypass (A27) to trace along the northern boundary. ▲ 'Coast Railway' line is present 200 – 250 m north of the Site boundary from the earliest reviewed mapping to the present day
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2.4 Environmental Database Review

Approach	The Landmark Envirocheck® Report provides a database of environmental information held by various statutory bodies including the EA, Local Authority (LA), Health & Safety Executive (HSE) and Public Health England amongst others. A full copy of the Envirocheck® Report is provided in Appendix E and the most relevant information is summarised below.
Features On-Site	The Landmark Envirocheck® Report lists the Site as entirely within a historical landfill Site, licensed by Hampshire County Council. Input dates are not available, however known wastes are indicated to have included general household wastes. The Landmark Envirocheck® Report also lists a registered landfill at the Site, licensed by Hampshire Council County. The landfill was licensed from 1977 but its current status is now 'surrendered/cancelled'. Information from Havant Borough Council indicates formal tipping to have commenced in June 1969 and continued at the wider consented site until 1989. Authorised waste included concrete waste, construction and demolition wastes, household waste and incinerator residues. The Site is also listed as a BGS recorded landfill (named Storehouse Lake Tip), further details of which are unknown. The Landmark Envirocheck® Report lists the Site as mostly within an area of infilled land (water, unknown filled ground). All of the above entries within the Envirocheck® Report are considered to represent the same landfill site.
Potentially Contaminative Features Off-Site	Pertinent entries included within the Landmark Envirocheck® Report located within 100 m from the Site include three discharge consents. All are located within 100 m to their nearby supplier, operations of which include 'mineral/gravel extraction/quarrying' and the 'making of glass/ceramics'. Discharge type is either traded or treated effluent as well as treated sewage discharge. The receiving water is Hermitage Stream (saline estuary) with discharge points located on the bank opposite the eastern boundary of the Site. Within the wider area, pertinent entries include a BGS recorded mineral site (Bedhampton Wharf) recorded approximately 120 m east of the Site. A Category 2 (significant) incident defined by oil pollution into Hermitage Stream is recorded approximately 150 m north-east of the Site. It occurred in May 1994 of which pollutants likely flowed downstream towards the eastern boundary of the Site and Langstone Harbour beyond.
Implications for Land Contamination Risk	Potential sources of contamination have been identified at the Site, including a historical landfill site. The landfill areas encompass the majority of the Site as well as much of the immediate surrounding area towards the west and south. Potentially contaminative off-Site features including the discharge consents, pollution incident into

	the Hermitage Stream and former sewage works to the north will also be considered in the preliminary risk assessment.
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2.5 Planning Review/Regulatory Enquiries

On-line Planning Portal	Hampshire County Council and Havant Borough Council	Date Accessed	15/01/2021
Findings	The following planning applications relating to the Site are listed as follows: ▲ 98/54097/002 - Land raising by one metre at Broadmarsh Playing Fields, Harts Farm Way, Havant. ▲ 94/58653/000 - Retention of four portable changing units and one portable toilet unit as accommodation for sportsmen and women using playing fields and one portable storage unit for groundsman at Broadmarsh Playing Fields, North Side of Harts Farm Way, Havant. ▲ 24554/14 - Temporary siting of storage unit for groundsman's machinery etc. at Broadmarsh Playing Fields, Harts Farms Way, Havant. No further information, nor associated documents / reports related to the above applications have been made available.		
Part 2A of the Environmental Protection Act (EPA) 1990	The Contaminated Land Officer (CLO) was contacted on 14th January 2021, copy of the correspondence is included appended as Appendix F. The following comments were made by the CLO regarding the Site: <i>'I can confirm that the site has not been previously determined to be Contaminated Land, and that the site has not previously been scheduled for inspection pursuant to considering such a determination. The site does appear on the Council's 'risk register' and given its proximity to habitat with European level protection designations; it does remain a potentially determinable site.'</i>		
Regulatory Consultation on the Proposed Site Investigation	In terms of the EA, the relevant Technical Specialist - (Groundwater Quality and Contaminated Land) was contacted by email on the 8th January 2021 to consult on the proposed programme of Site Investigation works at the Site. The pertinent points are summarised as follows: ▲ The EA is in general agreement with the proposals to investigate the Site; ▲ The presence and integrity of the sheet pile walls requires supporting evidence to demonstrate any containment of the landfill and for the controlled waters risk assessment; ▲ Their principal concern is the lateral migration of perched waters/leachate into Langstone Harbour and not specifically the Principal Chalk Aquifer which the EA considers to be acting as a pathway rather than a receptor. However, the EA are likely to still have concerns if the Chalk was grossly impacted by the landfill; and ▲ Characterisation of the waste mass base and presence of leachate are considered extremely important A copy of their full response email is included in Appendix F.		

2.6 Previous Reports/Information

List of Reports	Delta-Simons has reviewed the following reports relating to the Site: ▲ <i>Draft Phase II Environmental Audit</i> by WYG dated August 2017 (Ref: A102760);
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	A copy of this report is appended as Appendix G. Delta-Simons has also reviewed the following information: ▲ <i>Freedom of Information (FOI) Request Response</i> by Havant Council dated 19th November 2019 (Ref. 19-356)) A copy of the response email and associated documents is included in Appendix G.
Key Findings – WYG (2017)	The Draft Phase II Environmental Audit prepared by WYG (August 2017) identifies contamination impacted land and groundwater beneath this Site. Details and pertinent conclusions of the intrusive investigations are defined below. <u>Ground Conditions</u> The Site investigation comprised the drilling of six boreholes to depths of up to 35.0 m bgl, 10 window sample boreholes (to approximately 5.0 m bgl) and 11 trial pits (to a maximum depth of 4.0 m bgl). Environmental and geotechnical soil samples were taken, and a ground gas and groundwater monitoring scheme was conducted over a period of six weeks. Ground conditions encountered during the investigation consist of the following generalised geology: ▲ A thin layer of topsoil (up to 0.3 m bgl); ▲ A consistently thick layer of Made Ground up to 11.5 m bgl comprising a cover layer (up to approximately 5.0 m in thickness) and an underlying landfill layer (ranging from approximately 4.5 – 7.4 m thick across the Site); ▲ River Terrace Deposits comprising sand and gravel recorded a maximum thickness of 5.0 m in the east of the Site; ▲ Alluvium comprising sandy/gravelly clay recorded a maximum thickness of 3.5 m towards the west of the Site; and ▲ Chalk was encountered beneath the superficial deposits across the entirety of the Site to the base of each intrusive borehole (35.0 m bgl). The Made Ground consisted of two distinct layers: 'cover material' and 'landfill'. The general nature of the cover material comprised sandy gravelly clay with minor anthropogenic materials including brick and gravel. The underlying landfill layer recorded more significant anthropogenic materials such as paper, wood, plastic, metal and glass. Groundwater strikes were recorded in both landfill and superficial strata at depths ranging between 3.9 and 11.5 m bgl. During return monitoring visits, depth to groundwater was typically in excess of 5.0 m and was predominantly indicated to sit towards the base of the Made Ground or top of the Chalk. <u>Contamination Findings</u> Elevated levels of ground gases (maximum 98% methane, 46% carbon dioxide) have been measured within monitoring wells across the Site, with one elevated flow rate of 31.1 l/hr within the landfill material; however, flow rates were generally between -1 to 1 l/hr. Asbestos fibres were detected in 15 of 40 soil samples collected from the Made Ground (cover material and landfill). PAH contamination was identified in the topsoil. Hydrocarbons, ammoniacal compounds and cyanide were detected in water samples screened from the landfill, and also in one chalk groundwater sample. <u>Geotechnical Assessment</u> The cover material was generally uniform in composition. Standard Penetration Tests (SPTs) recorded uncorrected 'N' values (standard penetration resistance) between 18 and 50 in cable percussion boreholes and 8 and 50 in window sample boreholes. SPTs

	in the landfill material varied from 9 to 50, were generally greater than 25 (possibly due to the presence of large pieces of material within the strata e.g. wood, concrete cobbles etc and settlement and compaction over the last c.45 years since tipping ceased). SPT values in the superficial deposits ranged from 24 to 50. In the Chalk, values ranged from 17 to >50 with SPTs >25 from 15.0 m bgl onwards. Geotechnical testing included Particle Size Distribution tests (PSDs), Atterberg limits and undrained triaxial test. Alluvium shear strengths were reported at 29 kPa. <u>Geotechnical Recommendations</u> Heavily loaded structures should be founded into the underlying Chalk with consideration to negative skin frictions and the type of pile construction. Excavations within the Made Ground for temporary works should consider the stability of the ground and potential ground gas concentration. <u>Conclusions and Recommendations</u> The report concludes that previous use of the Site as a landfill presents a high risk of contamination that may be mobilised during construction resulting in pollution to controlled waters. Controlled waters are particularly sensitive at this location given the underlying Chalk Principal Aquifer. Surface waters are also at risk at the Site. The Hermitage Stream runs along the eastern boundary and Langstone Harbour lies approximately 170 m south of the Site. Langstone Harbour is designated a SSSI and RAMSAR site and is considered a sensitive receptor and needs to be protected from contamination. They concluded that there was a high risk to property/buildings and services at the Site, given the identified potentially hazardous ground gases. Further investigation was recommended.
FOI – Havant Council (2019)	The pertinent points from the Councils response dated the 19th November 2019 are: ▲ The attached documents provide a summary of documentary information relating to the means of containment, the area proposed for tipping, and the material(s) permitted to be tipped; ▲ Formal tipping commenced in June 1969 and continued at the wider consented site until 1989; ▲ The Site represented the first phase of tipping of the wider landfill site; ▲ The landfill is not understood to be lined to form an impermeable base and as such is considered to be a 'dilute and disperse' landfill which was the customary for this time. The initial cap is believed to be a simple soil cover and was not understood to be designed to provide an impermeable barrier to infiltration. Hampshire County Council information notes a 'Discharge to Estuary' against the summary information for this Site; ▲ Subsequent consent ref 98/54097/2/HBC is thought to relate to the further raising of land at the subject site by c.1m, with clay material. This is likely to be what was evident on the aerial photos in 1999 and further to this was likely installed to reduce infiltration of rainwater into the waste mass to reduce the impact of leachate on Langstone Harbour and Hermitage Stream; ▲ Havant Council is aware of an incident reported as a 'noxious discharge' from a penstock structure associated with the tip dated 22 February 1979. Anecdotal evidence indicates that work was undertaken by the Council to seal one of the penstock / outfall structures although no specific date or documentation of this is available; ▲ Methane has been monitored within the explosive range in the vicinity of the former tip, specifically within service ducts of built structures. However, the information

	provided notes that those structures are associated with separate areas of fill, and that appropriate protection is now in place; ▲ No permanent structures are associated with the subject Site; ▲ The Council is not aware of any documented monitoring of ground gases at the Site likely attributed to the lack of on-Site or nearby building structures; and ▲ The dilute & disperse construction would be expected to permit diffuse vertical migration of generated gas to atmosphere within the boundary of the landfill (i.e. the lateral migration is expected to be limited). The FOI response also contained the following plans (included in Appendix F): ▲ Storehouse Lake Tip Plan with no date however likely to be c.1968 (Ref HWU_14239_2); ▲ Storehouse Lake Tip Conditions List dated 18th September 1968 (Ref. HWU_14239_3); and ▲ Storehouse Lake Tip – Construction Schematic & Borehole Records dated April 1968 (Ref. HWU_14239_5G) Pertinent points of these documents/plans are as follows: ▲ The tip plan is incomplete but identifies the area of the landfill as 58.5 acres (23.7 ha); ▲ The conditions list summary includes the construction of channel diversion (presumably Storehouse Lake stream that ran through the centre of the Site identified in historical maps); ▲ Refuse was to be tipped in layers not exceeding 6ft; ▲ The following wastes were allowed to be tipped: soil, chalk, sand, gravel, hard core and other earth spoil, trade and domestic refuse. No phenolic wastes were allowed to be tipped without the prior consent of the Local Planning Authority (LPA); ▲ The text on the proposed schematic plans are hard to read but include the sheet pile wall structure between the paths around the periphery of the to be constructed landfill and Hermitage Stream to the east and potentially Langstone Harbour to the south east and south of the wide landfill site.
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3.0 Conceptual Site Model

3.1 Introduction

A Conceptual Site Model (CSM) represents the relationships between contaminant sources, pathways and receptors, to support the identification and assessment of Possible Contaminant Linkages (PCL).

3.2 Potential Contamination Sources

Potentially contaminative off-Site features including the discharge consents, pollution incident into the Hermitage Stream (1994) and former sewage works to the north are not considered to be notable sources of contamination at this Site in context of the former use of the Site as a landfill. As such these sources will not be considered further within the CSM.

Identified potential notable contamination sources that require further consideration are presented in the following table:

Reference	Source	Location	Dates Present	Potential Associated Contaminants of Concern
S1	Potential Made Ground deposits associated with cover material and re-engineering works on Site	Site-wide	Post 1977	Asbestos, heavy metals, total petroleum hydrocarbons (TPH) and polyaromatic hydrocarbons (PAHs)
S2	Historical Landfill Site	Site-wide and areas towards the west and south of the Site	Post 1977	<u>Main Risk Drivers – Domestic/Trade Waste (Site Wide)</u> Leachate, ammonium and significant ground gas generation potential. <u>Secondary Risk Drivers (Localised based on tipping of unauthorised materials)</u> Asbestos, heavy metals, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAHs), semi volatile organic compounds (SVOCs) and volatile organic compounds (VOCs)

* Based on UK Department of the Environment Industry Profiles

Relevant potential receptors are considered to include:

- ▲ R1 - Construction workers.
- ▲ R2 - Third parties during construction (adjacent Site users and adjacent residents).
- ▲ R3 - Future Site users and maintenance workers.
- ▲ R4 – Hermitage Stream leading to Storehouse Lake.
- ▲ R5 - The underlying chalk Principal Aquifers.
- ▲ R6 - The Built Environment (new buildings and infrastructure / utilities).

3.3 Potential Pathways

The potential pathways are considered to be as follows:

- ▲ P1 - Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment.
- ▲ P2 - Inhalation of organic vapours associated with contamination.
- ▲ P3 - Migration of ground gas / vapours into on-site buildings causing asphyxiation or risk of explosion.
- ▲ P4 - Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- ▲ P5 - Direct contact between aggressive ground conditions and new infrastructure.

Contaminant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
S1 Potential Made Ground deposits associated with cover materials and re-engineering works on Site	P1, P2, P3, P4, P5	R1, R2, R3, R4, R6	Low to Moderate Risk	Given the historical nature of the Site and evident from previous Site investigations, substantial volumes of Made Ground are present that form the landfill cover. However, based on information above this is likely to consist of the original rudimentary soil cover with a further c.1m clay cover (which was constructed across the Site in the late 1990s) above it. As such it is not expected that the cover material is likely to be notably contaminated although elevated PAHs were identified by WYG in the topsoils and asbestos within the cover material. It understood that a significant cut and fill scheme is needed to facilitate the proposed development. Prior to this being undertaken characterisation of the landfill cover materials will be undertaken by sampling, laboratory analysis and assessment against appropriate Generic Assessment Criteria (GAC) to determine the appropriateness of re-use within the cut/fill scheme. For any unsuitable soils/materials within the cut/fill scheme waste classification will be required prior to being disposed of off Site. A Materials Management Plan (MMP) will be subsequently required. During the previous investigation (WYG, August 2017), abundant asbestos fibres were detected in the shallow soils (cover) at the Site, thus, the risk posed to construction workers and off-Site human receptors during the redevelopment of the Site is considered moderate. Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils/materials through toolbox talks and in particular the presence of asbestos with an appropriate protocol to mitigate exposure to the workforce and general public if necessary. Based on the extensive waste mass below the cover material there is not considered to be a notable pollutant linkage between the Made Ground and the underlying Principal Aquifer, adjacent Hermitage Stream and/or Langstone Harbour beyond.	Y

Contaminant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
S2 Historical Landfill Site (extending off-Site)	P1, P2, P3, P4, P5	R1, R2, R3, R4, R5, R6	Moderate to High Risk	Given the likely significant thickness of waste, there is potential for generation of significant concentrations of hazardous ground gases and leachate at the Site even after tipping ceased approximately 45 years ago. The most significant pathways with respect to future Site users relate to the potential for gases to enter the proposed warehouse units. Consequently, ingress into the building may be possible through voids in the floor including service entry points and cracks. A comprehensive ground investigation and ground gas monitoring scheme will be required to adequately characterise the ground gas regime at the Site to allow suitable mitigation to be designed for the buildings to protect against ground gas ingress. Due to the increase in hardstanding in the proposed development (buildings/car parking etc) there is potential for increased lateral migration of ground gases off-Site. However, based on the lack of buildings in vicinity of the proposed development, and the proposed landscaping around the periphery of the Site that will allow some vertical migration of gases, it is not considered that there is a notable risk to offsite receptors from ground gases post development. Future maintenance/construction workers may come into contact with hazardous ground gases via entry into below ground confined spaces such as excavations or service entries/inspection points. Again, groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils/materials through toolbox talks and in particular the presence of asbestos with an appropriate protocol to mitigate exposure to the workforce and general public if necessary. RPE should be considered due to the potential for VOCs. The other significant risk driver is the potential for lateral migration of perched waters/leachate within the landfill towards Hermitage Stream and also Langstone Harbour beyond which is a European designated Site of ecological importance). A suitable ground investigation will need to be designed to again characterise the	Y

Contaminant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk Rating	Justification & Mitigation (if required)	Requires Investigation
				impact on these receptors with, if required, appropriate mitigation considered in context of the proposed development.	

4.0 Preliminary Ground Engineering Appraisal

4.1 Preliminary Ground Model

Based on the available information, it is anticipated that the Site is underlain by a sequence of:

- ▲ Topsoil; over
- ▲ Clay cover (c.1 m thickness); over
- ▲ Relict original soil cover (this may however have been removed during the clay cover provision works); over
- ▲ A significant thickness of Made Ground (waste) which is considered to be predominantly domestic & trade refuse from the 1970s; over
- ▲ Superficial Raised Marine, Tidal Flat and River Terrace superficial deposits; over
- ▲ Lewes Nodular Chalk Formation.

Given the presence of nearby watercourses and coastal environment, shallow groundwater is expected at the Site.

4.2 Plausible Geohazards

The geohazards listed below have been identified to follow guidance presented in the HA document HD22/08 'Managing Geotechnical Risk' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

The following substantial geotechnical risks are considered to be relevant to the proposed development³.

- ▲ Deep Made Ground (Waste): - The majority of the Site is anticipated to have deep Made Ground associated with former landfilling of wastes. This will be typically variable in nature and strength with a potentially low bearing capacity and unacceptable levels of total/differential settlement may occur.
- ▲ In addition to the Made Ground, substantial superficial deposits (such as Raised Marine Deposits) may result in soft spots or more substantial areas of soft ground. Again, unacceptable levels of total/differential settlement may occur in areas of proposed buildings or structures.
- ▲ Depending on the nature of the soils at the Site, potential underlying clay deposits at the Site may pose a risk to the foundations of the proposed development due to the effects of frost heave and shrink and swell associated with trees.
- ▲ Shallow groundwater is anticipated at the Site. Depending on the nature of the underlying superficial deposits, the possibility for running sands may be present at the Site.

The Landmark Envirocheck[®] Report lists the geohazards at the Site as:

- ▲ Potential for Collapsible Ground Stability Hazards – Low to Very Low
- ▲ Potential for Compressible Ground Stability Hazards – Very Low to Moderate
- ▲ Potential for Ground Dissolution Stability Hazards – Very Low
- ▲ Potential for Landslide Ground Stability Hazards – Very Low
- ▲ Potential for Running Sand Ground Stability Hazards – Very Low to Moderate
- ▲ Potential for Shrinking or Swelling Clay Ground Stability Hazards – Very Low to Low

Potential solutions and further steps to address the aforementioned issues are discussed in Section 5.0.

³ A substantial risk is defined by Delta-Simons in Appendix H.

5.0 Development Considerations

5.1 Potential Remediation Requirements & Solutions

Soils	During development of the Site, significant movement of the existing cover material is considered likely to allow a suitable development platform to be constructed via a suitable cut & fill scheme and MMP under the DoWCoP. The MMP will only be suitable for the cover material and would preclude re-use of the waste landfill material based on prior consultation with the EA. As such, working on the existing cut/fill programme and the need to cut into the waste materials alternative options need to be considered. These options are likely to include an Environmental Permit where treatment and/or redeposit of the wastes is part of the solution to achieve the development goal. Currently, the risk of soils/materials (within the existing cover) to future site workers and end users is considered low to moderate. It is anticipated that contamination (including the potential for asbestos containing materials (ACMs)) to be present within the shallow cover soils and materials. These soils/materials will require characterisation and assessment prior to re-use with remedial measures likely to comprise re-using cleaner materials in near surface soils of the proposed landscaped areas and more impacted materials (where geotechnically appropriate and providing no significant volatile human health or controlled waters risks are identified) under the buildings or placed deeper within the landscaped areas. Based on chemical analysis of the existing topsoils at the Site they may not be chemically appropriate for re-use in the proposed landscaped areas. Clean imported soils may be required to be imported in line with current best practice/guidance to provide a suitable cover system and growing medium. However, the existing soils may be able to be reused below the clean cover soils. Further investigation, sampling, analysis and assessment of the shallow soils is however, required prior to making a final recommendation on this.
Groundwater	Given the Site-wide deep Made Ground associated with the former tipping perched groundwater/leachate is likely to be present which may be adversely impacting the adjacent stream and Langstone Harbour beyond. Mitigation of this risk by remedial actions cannot be discounted at this stage subject to a comprehensive ground investigation and a generic and detailed quantitative risk assessment for controlled waters. However, it is considered that following development there is likely to be a significant reduction in overall permeability of the Site due to the presence of hardstanding, capping and a sealed drainage system. This is likely to correspond to a reduction in the leachate generation potential of the Site will occur which will mitigate risks to the chalk aquifer and more importantly to the adjacent Hermitage Stream and Langstone Harbour beyond.
Ground Gas	It is considered likely that significant ground gas risks exist at the Site. It would be prudent to allow for ground gas protection measures until monitoring data is available for interpretation. These gas protection measures may require active/passive ventilation below the floor of the warehouses in conjunction with an anticipated suitably designed, installed, sealed and verified propriety gas membrane across the floor slabs.
Building Fabric & Services	Widespread contamination at the Site is considered likely. Services are recommended to be placed in clean corridors. A drinking water pipeline assessment is likely to be required following soil chemical results along the proposed service corridor line within development platform.

	Aggressive ground chemistry may attack buried concrete (including any concrete piles) and allowance should be made for the provision of upgraded concrete specification subject to confirmation through a ground investigation.
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5.2 Geotechnical Considerations

Foundations & Floor Slabs	The shallow ground conditions are anticipated to comprise of Topsoil, landfill cover material and Made Ground (associated with former landfill material) underlain by a sequence of predominantly Raised Marine superficial deposits over bedrock of the Lewes Nodular Chalk Formation. The underlying ground conditions at the Site, most notably the deep fill material, are likely to pose a risk to any shallow foundations of the proposed development due to differential and total settlement issues. As such it would be prudent to allow for the foundations to be piled into the Chalk bedrock which will likely be driven piles with sacrificial cones. Consultation with the EA has indicated that this piling solution would be acceptable, subject to investigation and risk assessment. The floor slab may be required to be suspended.
Groundworks	Currently, proposed warehouse layouts comprise three different developments (a singular unit development, a two-unit development and a three-unit development). A significant cut and fill scheme is likely to be required to facilitate such proposed warehouse layouts. Shallow perched groundwater should be anticipated for any groundworks/earthworks, specifically in any areas of cut.
External Works	California Bearing Ratio testing will be required to determine road construction thickness. Consideration will need to be given for the potential for differential settlement to affect road surfaces and services and appropriately mitigated within the design. Geogrids may be required in external car parking areas to mitigate settlement issues associated with the deep fill materials. Service pipes e.g. drainage and potable water would ideally have flexible joints.

6.0 Conclusions & Recommendations

6.1 Land Contamination

Contamination Risks Associated with Ownership (Current Use)	Given that the Site does appear on the Council's 'risk register' and given its proximity to habitat with European level protection designations, there is considered to be a Low to Moderate risk of enforcement action by the regulatory authorities under Part 2A of the Environmental Protection Act, the Water Resources Act or the Environmental Damage Regulations, whilst the Site remains in its current use. The potential for legal action by surrounding landowners / Third Parties based on the potential for contamination to migrate off-Site (ongoing or historically) is considered to be Low to Moderate.
Potential Contaminated Land Development Risks	Widespread contamination is considered likely, the preliminary risk assessment has identified a Moderate to High risk of soil/groundwater contamination and hazardous ground gas at the Site. Asbestos is likely to be present within the Made Ground landfill deposits. Whilst further detailed assessment work and potential mitigation measures are required, at this stage it is considered unlikely that there will be significant impacts to human health or the wider environment arising from the development proposals. Furthermore, it is considered that following development, in line with recommendations for mitigation and the significant reduction in overall permeability of the Site due to hardstanding, cover system and a formal drainage system, that a likely reduction in the leachate generation potential of the Site will occur. Based on this it is considered that there will be an overall betterment in respect of existing groundwater risks to the aquifer and more importantly to the adjacent Hermitage Stream and Langstone Harbour beyond.
Plausible Geotechnical Development Risks	There are potentially substantial geotechnical development risks at the Site. Much of the Site is anticipated to have areas of deep Made Ground and superficial deposits (such as Raised Marine deposits). Such stratum is typically variable in nature and strength with a potentially low bearing capacity and unacceptable levels of total/differential settlement are likely to occur. Depending on the nature of the underlying near surface clay deposits at the Site, these may pose a risk to the foundations of the proposed development due to the effects of frost heave and shrink and swell associated with trees. Shallow groundwater is anticipated, if coupled with sandy superficial deposits the possibility for running sands may be present at the Site.
Recommendations	In relation to the Site, the following recommendations have been made: ▲ An intrusive ground investigation be undertaken to investigate: ○ Given the history of the Site substantial Made Ground is likely to be present at the Site. The nature and thickness of the Made Ground would need be quantified prior to development; ○ The presence, concentrations and leachability of substances of concern in shallow soils on-Site and within the waste mass (specifically volatile contaminants) would also need be chemically quantified and assessed in terms of risk to human health; ○ Presence of substances of concern in any perched water/leachate within the waste or groundwater within the chalk aquifer beneath Site would need to be assessed;

	○ Likelihood of significant ground gas and/or soil vapour intrusion into future buildings structures would need to be assessed; and ○ A geotechnical assessment to aid the design of foundations and engineering solutions. ▲ Additional sampling, laboratory analysis and waste classification may be required for any soils required to be disposed of off-Site; ▲ A Materials Management Plan (MMP) will be required, should non landfill waste materials be proposed for reuse on-Site; ▲ A piling risk assessment will be required to ensure risks to controlled water are managed appropriately; and ▲ A Remedial Strategy is likely to be required to be prepared. Consultation with the relevant regulatory authorities to agree the scope of the ground investigation is being undertaken at the present time and all other aspects of the project will require consultation and approval with these relevant bodies.
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Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Proposed Development Plans



	DEVELOPMENT ZONE
	LANDSCAPE BUFFER (INCL. PEDESTRIAN & SECONDARY ACCESS)
	PROTECTED AREA FOR SLOW WORMS
	MAIN SITE ACCESS
	SECONDARY SITE ACC. ZONE
	PEDESTRIAN ACCESS
	OVERHEAD CABLES

SITE AREA (APPROX.)	Ha	acre
Development Zone	5.533	13.67
Landscape Buffer (incl. footpaths)	2.824	6.97
TOTAL	8.357	20.64

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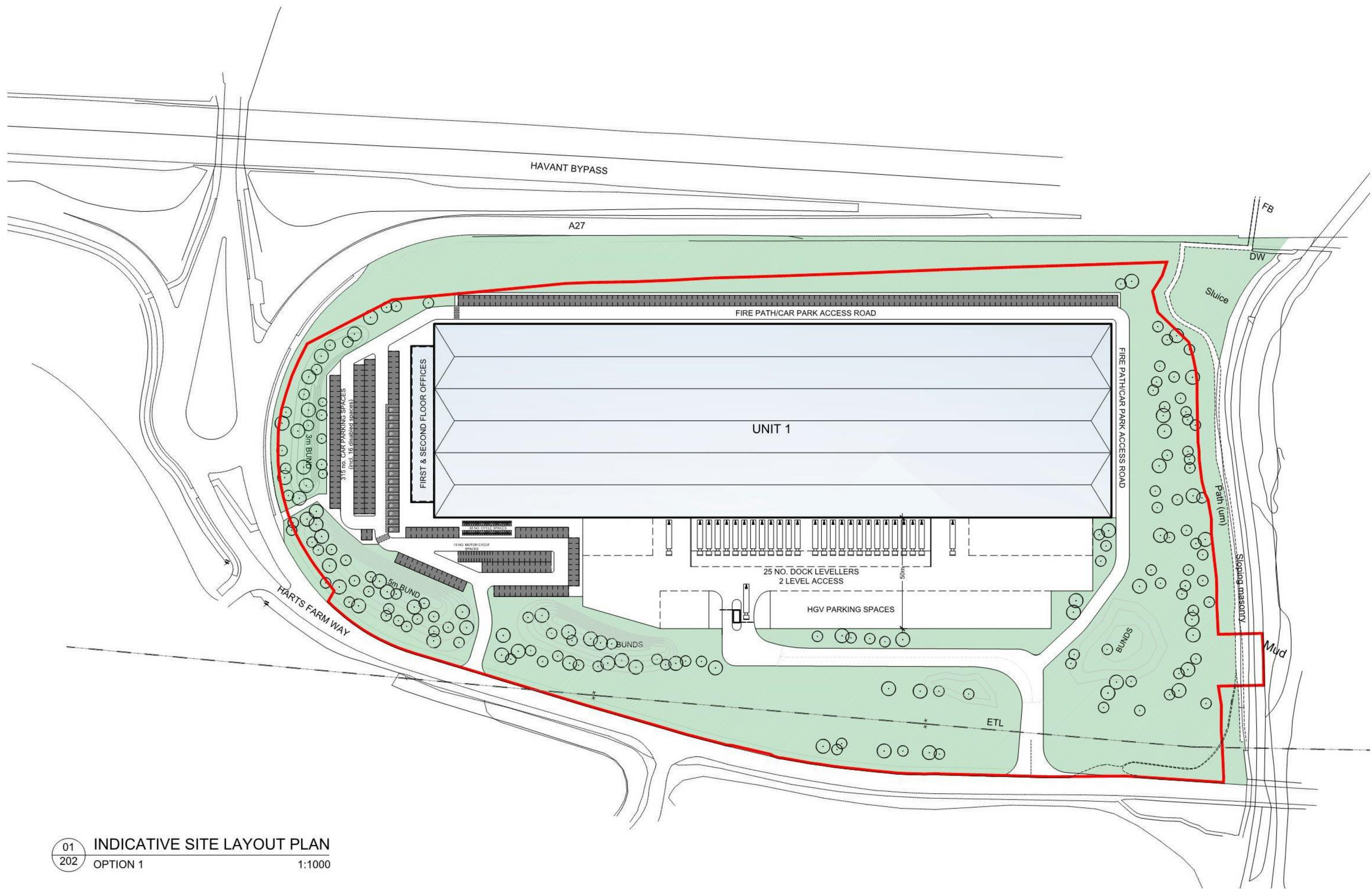
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TITLE
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DRAWING
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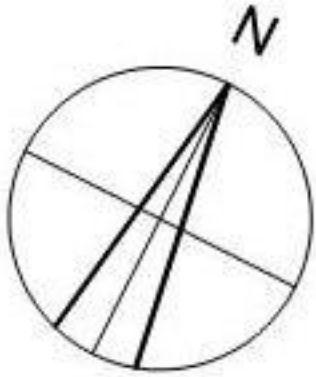
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01 INDICATIVE SITE LAYOUT PLAN
202 OPTION 1 1:1000

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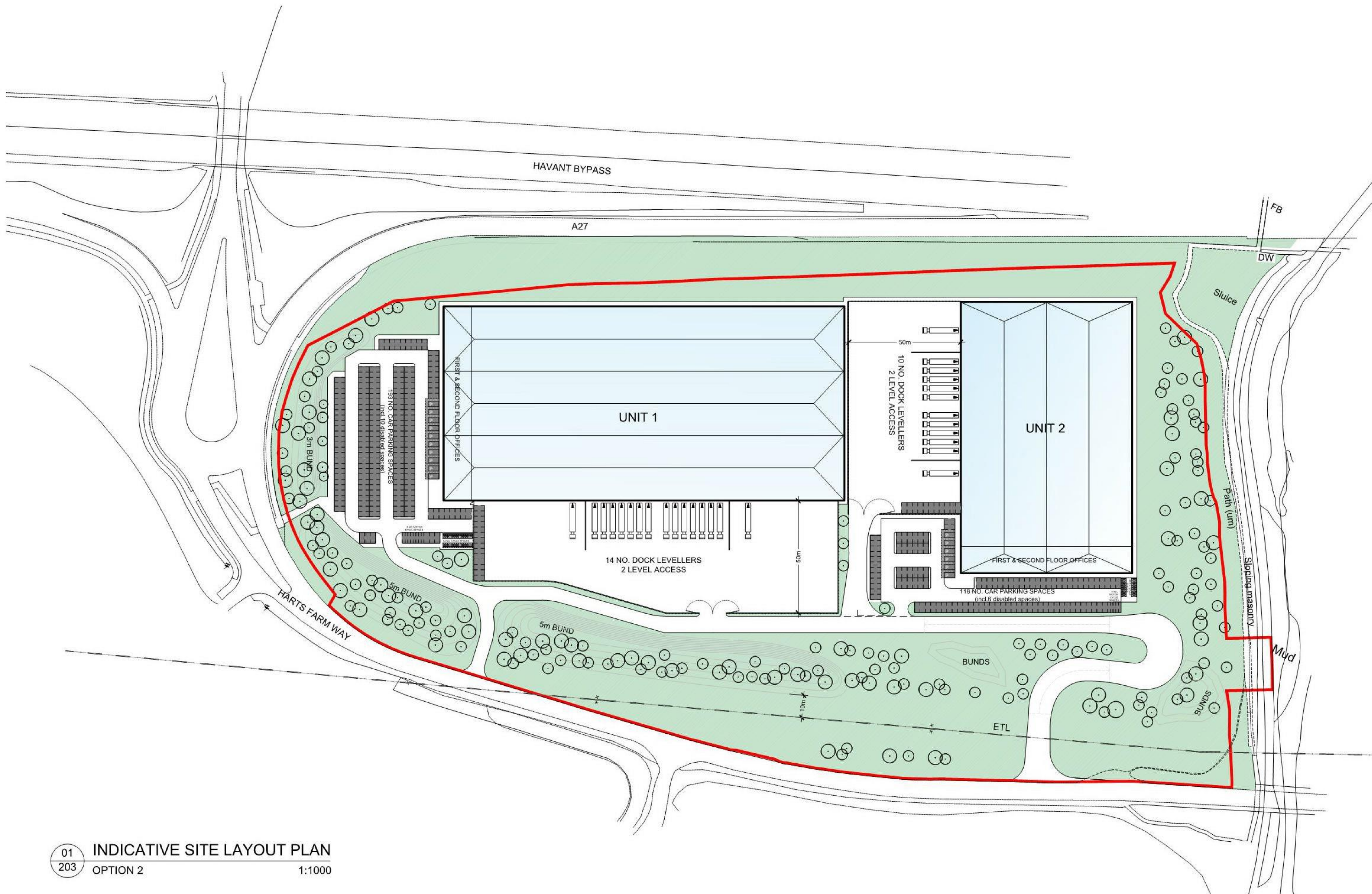


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TITLE
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OPTION 1
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01
203 INDICATIVE SITE LAYOUT PLAN
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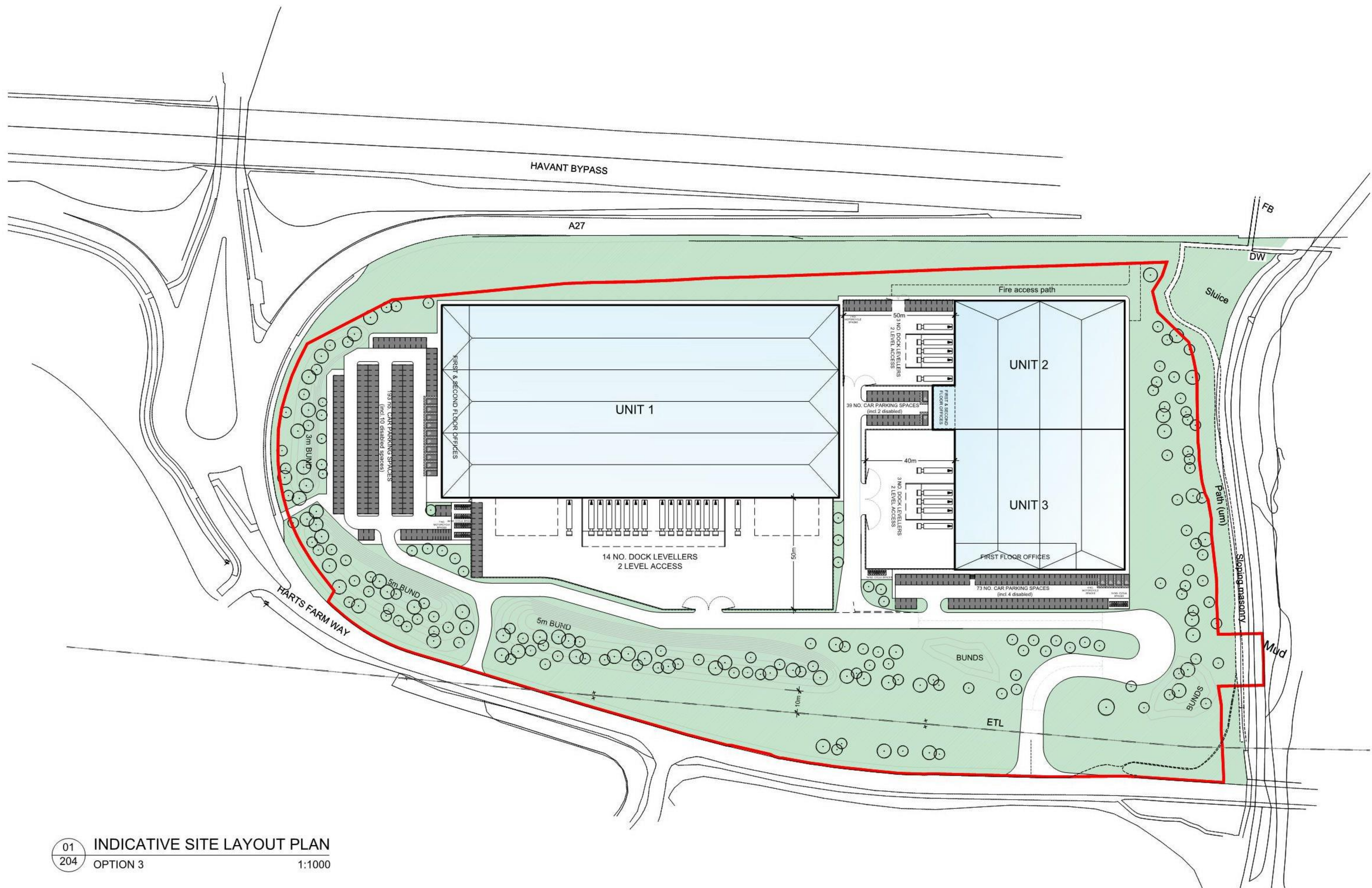
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NOTE:

TREE PLANTING AND BUNDS ARE INDICATIVE.
PLEASE REFER TO LANDSCAPE ARCHITECTS'
DRAWINGS FOR DETAILS OF SOFT LANDSCAPING

01
204 INDICATIVE SITE LAYOUT PLAN
OPTION 3 1:1000

-	09/02/2021	First Issue	AH	AC
REV	DATE	NOTE	DRAW	CHECK



CHARTERED ARCHITECTS

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TITLE
HARTS FARM WAY, HAVANT

DRAWING
INDICATIVE SITE LAYOUT PLAN
OPTION 3

CLIENT
CLOWES DEVELOPMENTS (UK) LTD.

DATE FEBRUARY 2021	SCALE 1:1000 @ A1	DRAWN AH
	STATUS PLANNING	CHECKED AC

DRAWING NUMBER
31383 / PL / 204

Appendix C – Site Photographs

Site Photographs



Photograph 1 – Site Entrance



Photograph 2 – Vegetation across the Site



Photograph 3 – View of the western dome from the eastern dome



Photograph 4 – Waste situated in the south of the Site



Photograph 5 – Waste observed in the centre of the Site



Photograph 6 – River, footpath and slope of the Site along the eastern boundary



Photograph 7 – Change in elevation looking toward the western boundary of the Site



Photograph 8 – Discharge/Outfall (Client Provided)



Photograph 9 – Concrete Headworks Structure Above Sheet Pile Wall (Client Provided)



Photograph 10 – Sheet Pile Wall (Client Provided)