


TECHNICAL NOTE

Ground Water Risk Assessment for Whitebox Student Campus at Groody Road, Newcastle, Castletory, Limerick

August 2025

GARLAND
Concepts Realised

CONTENTS

Description of change	Originator	Rev	Approval	Date
Initial Release	PC	1st	BL	02/05/2025
Further detail added	BL	A	BL	06/08/2025
Updated to comments	BL	B	BL	08/08/2025

1. INTRODUCTION

This documents outlines information the ground water risk has been prepared for a proposed student campus development at Groody Road, Newcastle, Castletroy, Co. Limerick. The development will consist of 196 no. Bed Clusters, distributed across 5 no. separate blocks, ranging in height from 5 - 8 storeys, with a total of 1,400 no. student bedspaces to be delivered in two phases along with associated site development works.

This document serves as an addendum to the Construction Environmental Management Plan (CEMP) and addresses an issue raised by the planning authority in their clarification of further information request. The information contained within this report is a consolidation of data already provided or utilized within the planning application documentation, including the Water Framework Directive Assessment, the CEMP, and the geotechnical investigation information contained within the Resources and Waste Management plan . A particular focus of this report is to provide greater detail on the type of piling that will be employed during construction. The purpose of this addendum is to elaborate solely on the previously submitted information within the planning application.

2. WATER INFORMATION

2.1. Hydrogeology

The study area is located in an aquifer classified as “Li”, Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. This Li area is surrounded by an area of “Lm”, Locally Important Aquifer which is Generally Moderately Productive.

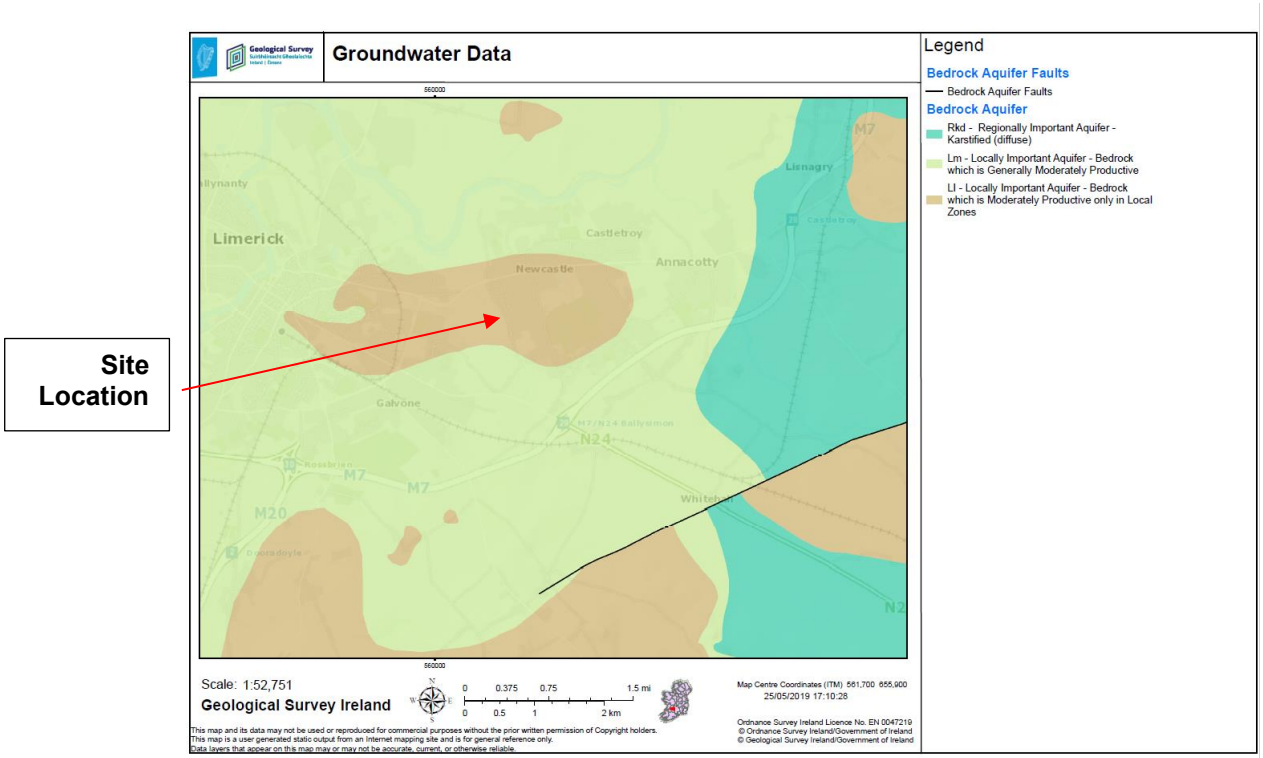


Figure 1 – Groundwater Resources (Aquifers)

The bedrock aquifer beneath the site is mapped by the GSI to be within the Limerick City East Groundwater Body (GWB) (EU Code: IE_SH_G_138). The Limerick East GWB covers approximately 46 km² and spans areas across the east of Limerick City. The area is generally

low-lying, with higher elevations to the east and, to a lesser extent, to the north. Elevations decrease towards the various river estuaries around Limerick city. At the boundaries of the GWB, the highest elevations are to the north at Woodcock Hill Bog and to the east where the Slieve Felim Mountains form an area of higher elevation and the Silvermine Mountains east of Limerick.

2.2. Aquifer Vulnerability

The bedrock geology predominately consists of Carboniferous volcanic rocks. This is overlain by by esturine silts and clays. Most of the site is noted as being "urban" as it is a brownfield site that was previously filled.

The vulnerability of the aquifer ranges from "extreme to moderate" across the study area. Using this rating along with subsoil permeability, a review of the possible subsoil thickness indicates depth to bedrock is generally expected between 0 and 3 metres below land surface. However, this type of shallow depth is not as experienced within trial holes undertaken within the site and it likely affected by the previous filled and urban nature of the site. Using a moderate rating which is seen in western section of the site consisting of Estuarine Sediments (silts/clays) subsoils, a non urban subsoil, the expected bedrock would be between 5m and 10m.

Table 1- Vulnerability mapping criteria (adapted from DELG/EPA/GSI, 1999)

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate permeability (*e.g.* Sandy subsoil)	Low permeability (*e.g.* Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	> 3.0m	3.0 – 10.0m	3.0 – 5.0m	> 3.0m	N/A
Moderate (M)	N/A	> 10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	> 10.0m	N/A	N/A
Notes: (1) N/A = not applicable (2) Precise permeability values cannot be given at present. (3) Release point of contaminants is assumed to be 1-2m below groundwater surface					

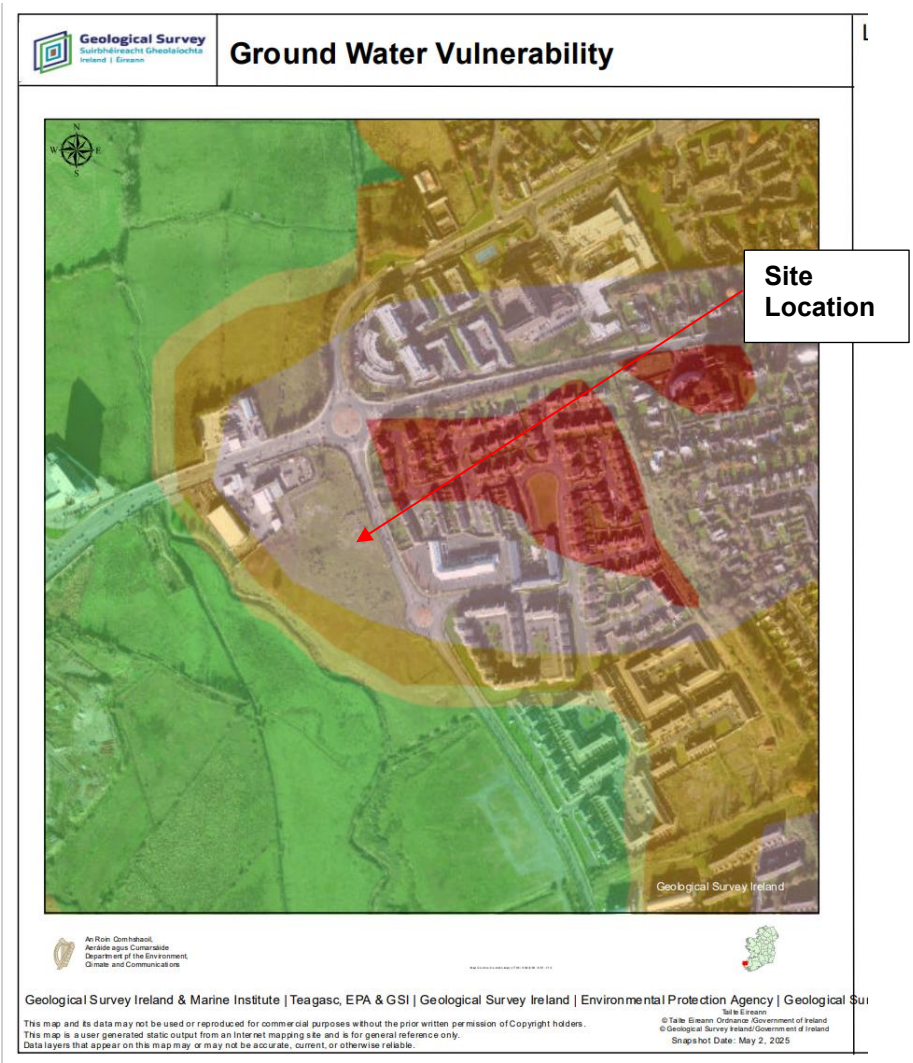


Figure 2 - Groundwater Vulnerability

2.3. Water Framework Directive Groundwater Status

The Water Framework Directive (WFD) classification scheme for water quality includes two status classes: good and poor. The assignment of the status class depends on the above factors e.g. ecological and chemical status of the groundwater body.

The groundwater body in this area has been assigned ‘Good’ status.

The underlying groundwater body is the Limerick City East groundwater body (GWB). The relevant European codes is IE_SH_G_138.

Figure 3 - Ground Waterbody WFD Status 2016-2021

2.4. Water Supplies

There are no regional groundwater supplies or Source Protection Areas (SPA) identified within this area. The nearest SPA sites are approximately 11km east in Murroe.

There is an existing well North of the site, reference IE_GSI_GW_Well_19928 which appers to have been drilled in 1973 with the site reference “Parkway Motor Inn”. However the area is serviced by public mains therefore it is unlikely that many wells are currently used for potable supply.

2.5. Hydrology

The proposed project is located within the Shannon International River Basin District (SIRBD) in Hydrometric Area No. 24 of the Irish River Network. It is within the Towlerten River/Stream, Groody River and ultimately River Shannon catchment. The Groody River catchment encompasses an area of approximately 57 km2. The river extends from Caherconlish to the River Shannon in Limerick and a number of tributaries and streams enter along its course. The proposed road lies within the sub-basin 25D_9 - Shannon[Lower]_SC_090.

The following river occur within the vicinity of the proposed project:

- Towlerten River

- Groody River;
- River Shannon;

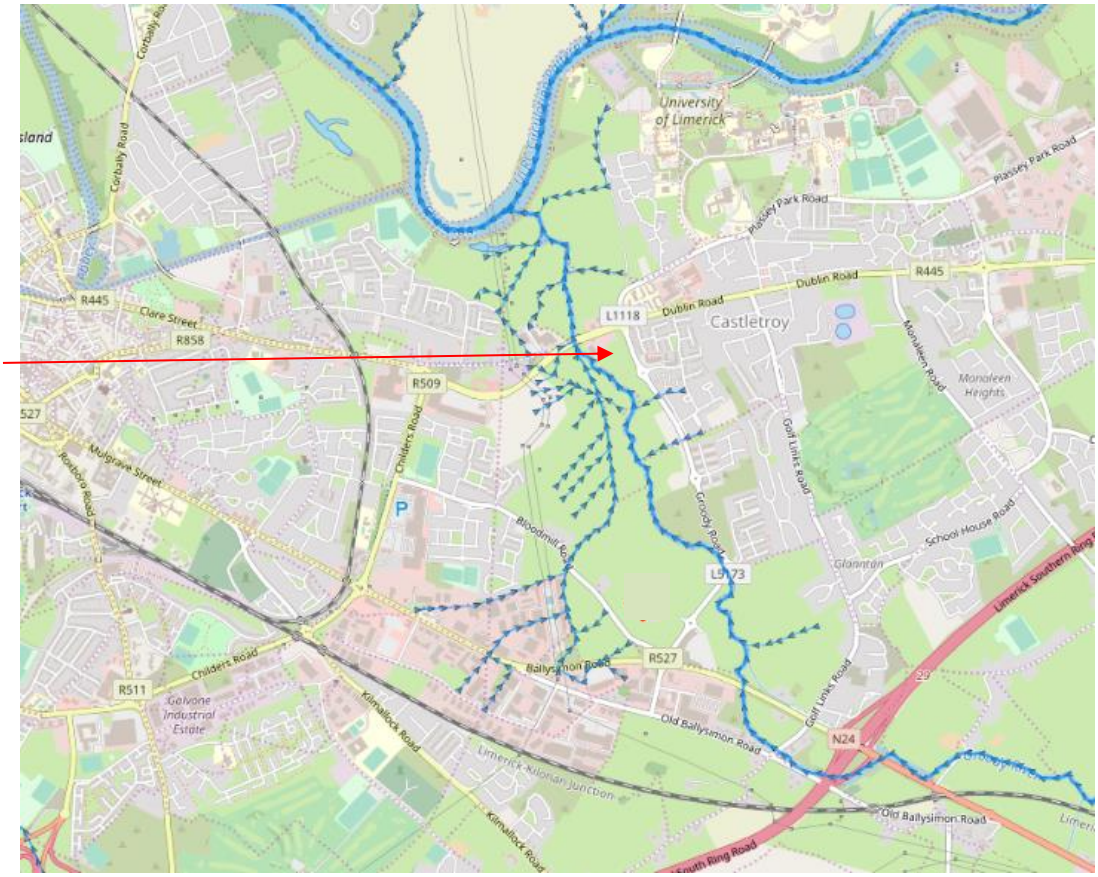


Figure 4 - Water Features

2.6. Water Quality

In accordance with the Water Framework Directive (WFD), each river catchment within the SIRBD was assessed and a water management plan detailing the programme of measures was put in place for each. For the Groody River WMU (Water Management Unit) the main pressure preventing achievement of 'Good Status' is diffuse agricultural pollution.

2.7. River Levels

There is a real time river gauge on the Groody River at the Groody Bridge to the North West of the site. The gauge reference is 25012 and data is available from 2002 to present day. The following levels are present at this station from this data:

Levels equalled or exceeded for the given percentage of time (mAOD Malin Head OSGM15) (Data derived for the period 2002 to 2025)								
1%	5%	10%	25%	50%	75%	90%	95%	99%
5.586	4.848	4.523	4.08	3.741	3.582	3.503	3.465	3.42

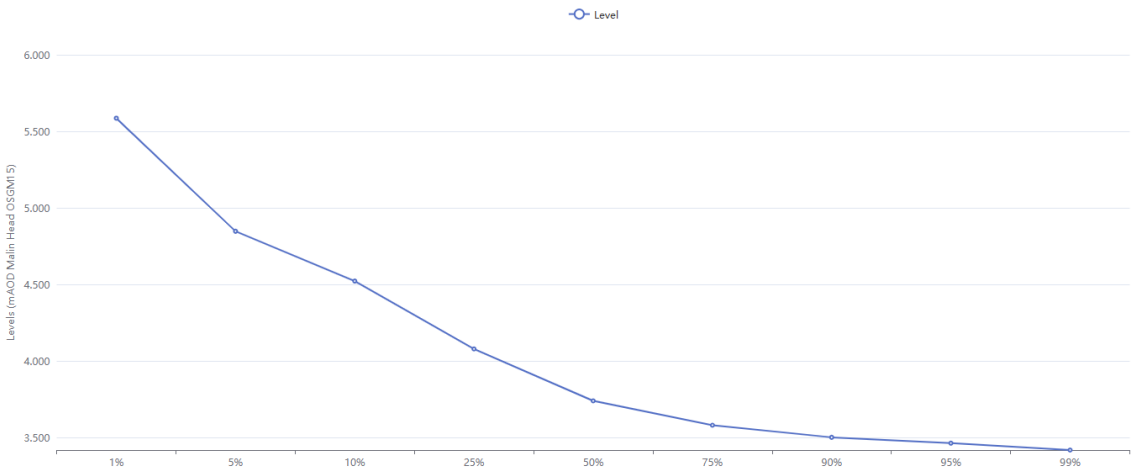


Figure 5 – River Gauge Levels

As the site is located adjacent to the river, the 50th percentile (median) river level has been chosen for assessment purposes to represent the groundwater table. This is because the river is likely in hydraulic connection with the surrounding unconfined aquifer, meaning that groundwater levels near the river typically reflect the river stage. The 50th percentile represents the level the river is at or above 50% of the time, providing a realistic and balanced estimate of typical groundwater conditions. Unlike maximum or minimum values, which reflect extreme or rare events, the median offers a more stable and representative baseline for assessing groundwater behaviour at the site.

3. FLOODING

A detailed flood risk assessment has been prepared by the site. In summary the areas for development of site including buildings, road and surface water infrastructure, including the wetland which are within Flood Zone C. The area of the site adjacent to the River is within Flood Zone A and B. At the time of the toparchical survey the river level was approximately 1m below the lowest level of proposed open excavation for the site, being the wetland.

4. GEOTECHINCAL INVESTIGATIONS

A large proportion of the site has previously been filled with construction and demolition waste, mostly clay with stones and boulders but also containing waste associated with being from construction sites. This has elevated the site above the existing levels and has raised the majority of the site higher above the ground water level. In 2010 a geotechnical and environmental investigation was undertaken in conjunction with Limerick Council which has been provided to us. In 2024, GARLAND witness 5 number trial holes to verify the 2010 investigation. The result of these investigation are provided in graphic and summary table form below. The 2010 investigation noted in some test locations that perched ground water was encountered typically at a change in ground strata and permeability rates. Similarly, 3 of the 2024 trail holes some water ingress from perched locations. It is not apparent that any test location met bedrock, despite the mapping and available desk study data suggesting this should be relatively shallow.

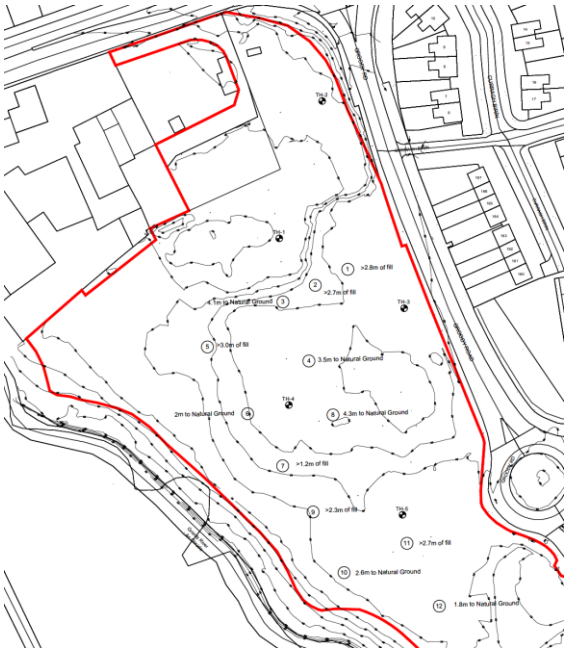


Figure 6 – 2010 and 2024 Site Investigation Locations

Table 2- 2024 Trial Hole Results

Trial Hole No	1	2	3	4	5
Depth	1.8m	1.4m	3m	2.5m	2.1m
Original Ground Found	Yes	Possibly	No	No	No
Typical Contents Inspected Visually	C+D Waste incl: Clay Stones incl up to boulder size Galvanised sheeting Wood Bricks Plastic Piping/cables	C+D Waste incl: Clay Stones incl up to boulder size Concrete kerbs Blocks Timber post Insulation (small amount) plastic	C+D Waste incl: Clay Stones incl up to boulder size Concrete kerbs Concrete with rebar Bicks Drain pipe Cooper pipe plastic	C+D Waste incl: Clay Stones incl up to boulder size Plastic drain Plastic bottle Timber Pipes cables bricks	C+D Waste incl: Clay Stones incl up to boulder size Plastic Wood
Notes	Possibly most non clay, stone material. Water at base, possibly perched on natural ground	Terminated by obstruction. Water ingress noted.		Water ingress noted	Black coloured layer present within top 1m and black appearing at base of trial pit

5. PROPOSED EARTHWORKS

The following earthworks are envisaged during the construction of this project:

- Remediation of existing filled material within the site. These works will primarily take place above the previous natural ground level
- Installation of piled foundations. It is envisaged that these pile foundations will extent down and into bedrock. The piling will be placing place on an elevated position when comparted to the pre-filled natural level of the site. The piling operation does present a potential direct pathway from the surface to the groundwater table.
- Installation of new roads, footpaths and associated surface finishes. These will be constructed at an elevated position compared to the pre-filled natural ground. These works will be occurring on remediated and replaced ground material. The finished levels are similar in nature to the current levels of the site both in the filled and no filled areas.
- Installation of new drains, sewers, ducts and associated services. The surface water sewers are up to 2.5m deep some of which will be occurred on non filled areas such as for the construction of the surface water wetland. The foul sewers extend to up to 3.8m in depth. The deeper depths are located on filled areas of the site and adjacent to the existing road.
- Installation of surface water attenuation tank which is is 2.5m in depth.
- Construction of surface water attenuation and wetland. The wetland is 2.1m in depth.

A GARLAND drawing reference W0657-014 has been prepared to illustrate graphical the above scenarios.

6. RISK ASSESSMENT

The proposed construction works primarily occur above the groundwater table, significantly reducing the risk of widespread groundwater contamination. However, the installation of piled foundations, which will extend into bedrock from an elevated platform, presents a localized but direct pathway for potential contaminants to migrate vertically into the underlying aquifer system. This is particularly relevant given the piles may breach confining or low-permeability layers.

Other activities such as site remediation, road and surface infrastructure construction, and shallow utility and drainage works, including attenuation tanks and wetlands (with depths up to 3.8m), are generally confined to the unsaturated zone and in already filled and to be remediated areas of the site. As such, they pose low risk to groundwater, provided that best management practices are followed, especially during handling of potentially contaminated fill.

In summary the key risks include:

- Creation of preferential pathways through piling, allowing surface water or residual contaminants to reach groundwater. However this would be typical of most construction projects where deep foundations are required.
- The creation of the large area wetland within a lower portion of the site at one of the lowest open excavation levels relative to Ordinance Daturm.

- Installation of deeper section of foul and surface water drains

- Disturbance or mobilization of existing contamination during remediation or excavation, particularly in filled areas.

- Infiltration of contaminated runoff or construction-related fluids, especially during wet weather or through poorly managed drainage.

7. RECOMMEDED MITGIATION MEASURES

The following are the recommended mitigation measures for this project to reduce risk of ground water contamination:

- Best practice construction methodologies to be adopted to control runoff and prevent the infiltration of hazardous substances during the construction phase including the use of silt fencing and berms to be placed closely around active works and piling zones. These controls are to be relocated progressively in line with the advancement of works to ensure ongoing protection.

- Where water must be pumped from the excavations during the construction phase of the Proposed Development, water will be discharged by the contractor, following appropriate treatment (e.g., settlement or hydrocarbon interceptor) to sewer in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from LCCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water. The Contractor will be required to provide a site-specific dewatering plan, clearly setting out proposed excavation methodology, estimated dewatering rates, details of the proposed treatment system, and discharge location. Under no circumstances will any untreated wastewater generated onsite (from washing equipment, road sweeping etc.) be released to ground or to drains. Where required, all public sewers will be protected to ensure that any untreated wastewater generated onsite enters the public sewers.

- Implement cased bored piles or continuous flight auger (CFA) piles over other piling methodologies.

    - Cased bored piles are well-suited for construction in areas where contact with groundwater is expected. This method involves drilling a hole into the ground using a rotary rig and supporting the borehole with a temporary or permanent steel casing to prevent collapse and water ingress. Once the desired depth is reached, reinforcement is placed inside the casing and concrete is poured, either by tremie pipe or directly, depending on groundwater pressure. The casing provides a physical barrier that isolates the excavation from groundwater, allowing for clean and controlled concrete placement. This method is particularly effective in unstable or water-bearing soils, where maintaining borehole integrity is critical to pile performance.

- Continuous flight auger (CFA) piles also offer advantages in groundwater conditions, as they allow for a nearly closed system that minimizes disturbance and water inflow. The process involves drilling with a hollow-stemmed auger, which continuously removes soil as it advances. Once the design depth is reached, concrete is pumped through the hollow stem while the auger is withdrawn, creating a pile shaft that is formed in one continuous process. Reinforcement is then inserted into the fluid concrete. This method reduces the risk of borehole collapse and prevents groundwater from entering the excavation, making CFA piling a reliable and efficient choice in saturated ground conditions.

- Uncased bored piles should be avoided in areas where groundwater is present or near the water table, as they can create ecological risks by allowing the uncontrolled migration of groundwater. When groundwater flows through an uncased pile shaft, it may pick up pollutants or sediment from surrounding soils or from ground level above, spreading contaminants to other areas, potentially affecting nearby water bodies or aquifers. Driven piles may also cause soil displacement and increase permeability, potentially allowing groundwater to flow along the pile shaft, compromising the foundation's long-term stability

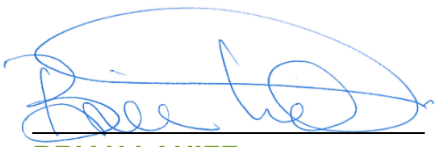
- The area around piles will be elevated during construction to prevent surface water runoff from entering the piling zone.

- Surface trenches will be constructed to redirect runoff away from the excavation and piling areas toward temporary surface water storage tanks or ponds.

- Ensure remediated ground is appropriately screened and unsuitable and contaminated materials disposed of appropriately off site.

- For drainage elements, use pre-cast elements such and headwalls and manholes over insitu construction to reduce the period of open excavations

- Given the intend programme duration for the project, schedule the construction of the wetlands for the summer months when ground water levels will be lowest. In advance of the construction of the wetland monitor the water level. Employ best practice run-off control to avoid unnecessary surface water entering the under construction wetland excavation. Employ best practice stockpiling and excavation methodologies.

Signed: 

BRIAN LAHIFF
CHARTERED ENGINEER

Date: 8 August 2025

Consulting Engineers

Project Management

Safety Management

International

www.garlandconsultancy.com

GARLAND

Concepts Realised