EIAR Addendum – Chapter 7 Water

Cam Quarry, Brideswell, Co. Roscommon – Continuance of Use (Planning Ref. PD/25/60577)

Roadstone Ltd

Cam, Brideswell, Co Roscommon.

Prepared by:

SLR Environmental Consulting (Ireland) Ltd

7 Dundrum Business Park, Windy Arbour, Dublin, D14 N2Y7

SLR Project No.: 501.065512.00001

Client Reference No: 00180

14 September 2026

Revision: Final

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
Final	14 September 2026	MS/SMcD/IMR/TP	TP	TP

Basis of Report

This document has been prepared by SLR Environmental Consulting (Ireland) Ltd (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with Roadstone Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature, and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

Table of Contents

Figures

Drawings (ACP-1, ACP-2, ACP-3, ACP-5 and ACP-5 provided as separate drawings)

Appendix A

Water Management Infrastructure Design (Causeway Flow Models)

1.0 Introduction

Roadstone Limited (hereafter referred to as "Roadstone") has submitted a planning application to Roscommon Co. Council (P. Ref. PD/25/60577) for the continued use of the existing quarry development permitted by P. Ref. 04/147 and ABP Ref. PL20.215417.

This EIAR Addendum Chapter 7 Water provides supporting information to the 1st Party appeal by Roadstone Ltd. against the decision of Roscommon Co. Council to refuse permission for the proposed development. Refusal Reason No. 1 states:

> *The Planning Authority in consultation with Roscommon County Councils Environment Department is not satisfied based on submissions received that it has been satisfactorily evidenced that dewatering will not be required to facilitate the proposed development and that satisfactory proposals for and assessment of dewatering arrangements have been provided. It is considered therefore that based on the information submitted in the Environmental Impact Assessment Report (as updated) and as identified in the Environmental Impact Assessment carried out by the Planning Authority, a sufficient level of information and assessment has not been provided in relation to impacts on Water and Biodiversity (with particular attention to Habitats and Birds Directives).*
>
> *Having regard to the foregoing, it is therefore concluded that there is insufficient information and insufficient mitigation measures provided for the competent authority to make an EIA determination that there is an acceptably low likelihood of environmental effects of a magnitude which would give rise to a significant effect on sensitive environmental receptors as a result of the proposed development proceeding. Therefore, if permitted, the proposed development would be contrary to the provisions of policy objectives ED 6.17 and ED 6.18 set out in the Roscommon County Development Plan 2022-2028 and would be contrary to the proper planning and sustainable development of the area.*

Section 2 of this Addendum provides an update and further assessment of groundwater levels on the site. Section 3 describes the proposed quarry floor / extraction level and on a precautionary basis assesses dewatering requirements . The proposed water management system for the quarry, including engineering design basis and drawings is set out in Section 4. A risk assessment is provided in Section 5 and the proposed water environment monitoring programme is detailed in Section 6.

2.0 Groundwater Levels Update

2.1 Groundwater Level Information Update

The revised EIAR Chapter 7 submitted as part of the Further Information response to the Planning Authority provided a summary of groundwater logger data from the 4 no. on-site monitoring boreholes MW3, MW4, MW5 and MW6 for the period August 2023 – April 2025 in Table 7-7, and Table 7-8 provided a summary of manual groundwater levels over the same period. For ease of reference these Tables are reproduced below in **Tables 1** & **2**. Refer to Figure 7-1 RevA enclosed for monitoring boreholes locations. (Note: the other boreholes shown on Figure 7-1 are decommissioned and not accessible for monitoring)

Table 3 below, provides a summary of additional monitoring carried out at the site from April to September 2025, providing complete monitoring over an extended 2-year period. **Table 4** provides a summary of the manual groundwater levels at the site from August 2026.

Please note Tables 3 & 4 show new data that did not form part of the original application assessment.

Table 1: Summary of groundwater level logger data (August 2023 – April 2025)

Reproduction of EIAR Table 7-7 (from Further Information submission)

		MW3	MW4	MW5	MW6
Strata			Limestone	Limestone	Limestone
mAOD	Minimum	53.59	56.85	51.90	64.42
	Average	60.59	60.94	60.09	72.51
	Maximum	67.34	65	63.85	75.20
m	Range	13.76	8.15	11.95	10.78

Table 2: Summary of manual groundwater levels (August 2023 – April 2025)

Reproduction of EIAR Table 7-8 (from Further Information submission)

		MW3	MW4	MW5	MW6
Strata			Limestone	Limestone	Limestone
mAOD	Minimum	53.97	55.17	53.36	66.06
	Average	58.99	58.9	58.25	70.40
	Maximum	64.01	62.63	63.14	74.73
m	Range	10.04	7.46	9.78	8.67

Table 3: Summary of groundwater level logger data (April 2025 – September 2025)

		MW3	MW4	MW5	MW6
Strata			Limestone	Limestone	Limestone
mAOD	Minimum	49.65	57.64	52.75	64.90
	Average	51.54	60.60	54.99	69.76
	Maximum	59.22	62.35	58.11	74.27
m	Range	9.56	4.71	5.36	9.37

Table 4: Summary of manual groundwater levels (28th August 2026)

		MW3	MW4	MW5	MW6
Strata			Limestone	Limestone	Limestone
mAOD		54.98	55.27	53.81	61.90

Both the Applicant's on-site observations and the findings of the on-site groundwater monitoring programme indicate that water accumulation within the quarry is seasonal in nature and varies throughout the year in response to prevailing weather conditions. During the late autumn, winter and spring months, water run-off is typically present within the low-lying area (sump / infiltration area) of the quarry, whereas conditions can be substantially drier during the summer and early autumn months.

Consequently, groundwater levels and the presence of water in the sump / infiltration area are not static and fluctuate seasonally, reflecting natural hydrological / hydrogeological conditions.

This seasonal water accumulation variation within the sump / infiltration area is illustrated in **Plate 1** and

Plate 2 below, which show the presence of water in April 2025 and an absence of water in August 2026 within the quarry sump / infiltration area. **Plates 3**, **4** and **5** show the dry condition of the overall quarry extraction area in August 2026.

The collection of surface water runoff within the sump / infiltration area allows extraction activities to continue in dry working conditions throughout quarry extraction area. The active extraction areas are currently located at elevations ranging from approximately 70 mOD to 85mOD. Roadstone has operated the quarry for the past 20-years without the requirement for any dewatering.

Plate 1: April 2025 – Southwest Corner (Lowest Point c. 62-63mOD) of Quarry – Sump / Infiltration Area showing surface water run-off accumulation

Plate 2: August 2026 - Southwest Corner (Lowest Point) of Quarry – Sump / Infiltration Area showing no water (dry)

Plate 3: August 2026 - Southwest Corner (Lowest Point c. 62–63mOD) of Quarry – Sump / Infiltration Area showing No Water Present (dry)

Plate 4: August 2026 – View from Southwest Corner of Quarry – above Sump / Infiltration Area looking East

Plate 5: August 2026 – View from Southwest Corner of Quarry - above Sump / Infiltration Area looking North

The seasonal variation is further demonstrated by the fluctuation of groundwater levels for the monitoring boreholes shown in **Tables 1 - 4** above. Over the period August 2023 to April 2025 the fluctuation range was 13.76m in MW3, 8.15m in MW4, 11.95m in MW5 and 10.78m in MW6 where data loggers are installed. Subsequent data downloaded for the period April 2025 to September 2025 shows similar seasonal fluctuation range was 9.56m in MW3, 4.71m in MW4, 5.36m in MW5 and 9.37m in MW6.

Error! Reference source not found.**-4** below show the logger data for the on-site borehole ground water levels and on-site rainfall for the years August 2023 to September 2025 (c. 2 year period). The proposed quarry floor level of 65mOD is shown in the charts for reference.

Please note Chart 4 shows new data that did not form part of the original application assessment.

Chart 1: 2023 (August – December) Groundwater levels at on-site boreholes and on-site rainfall

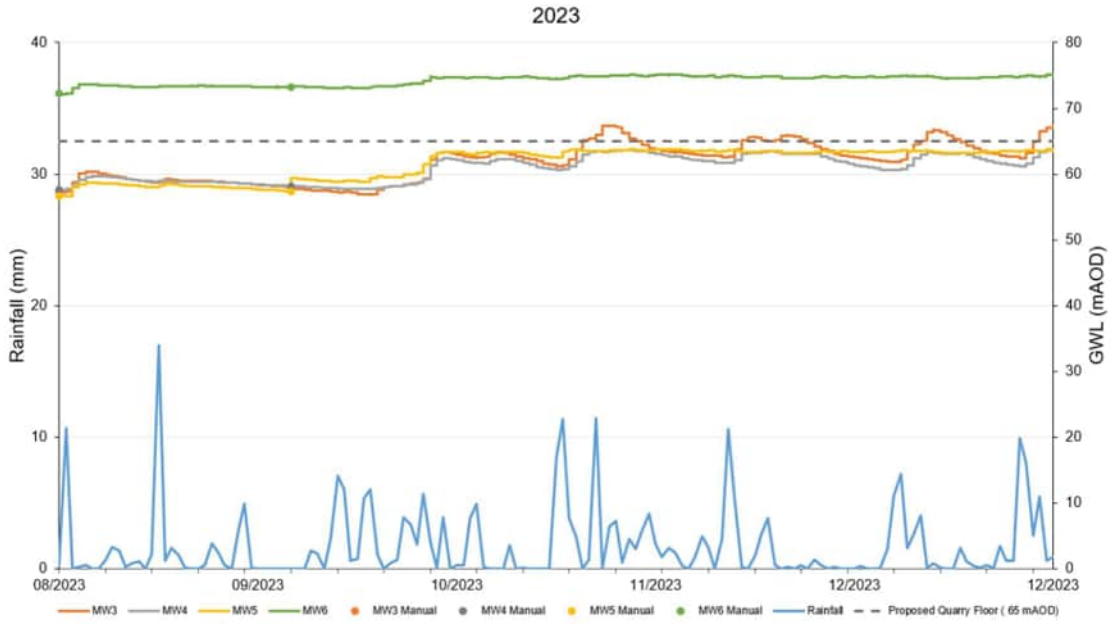


Chart 2: 2024 (January – December) Groundwater levels at on-site monitoring boreholes and on-site rainfall

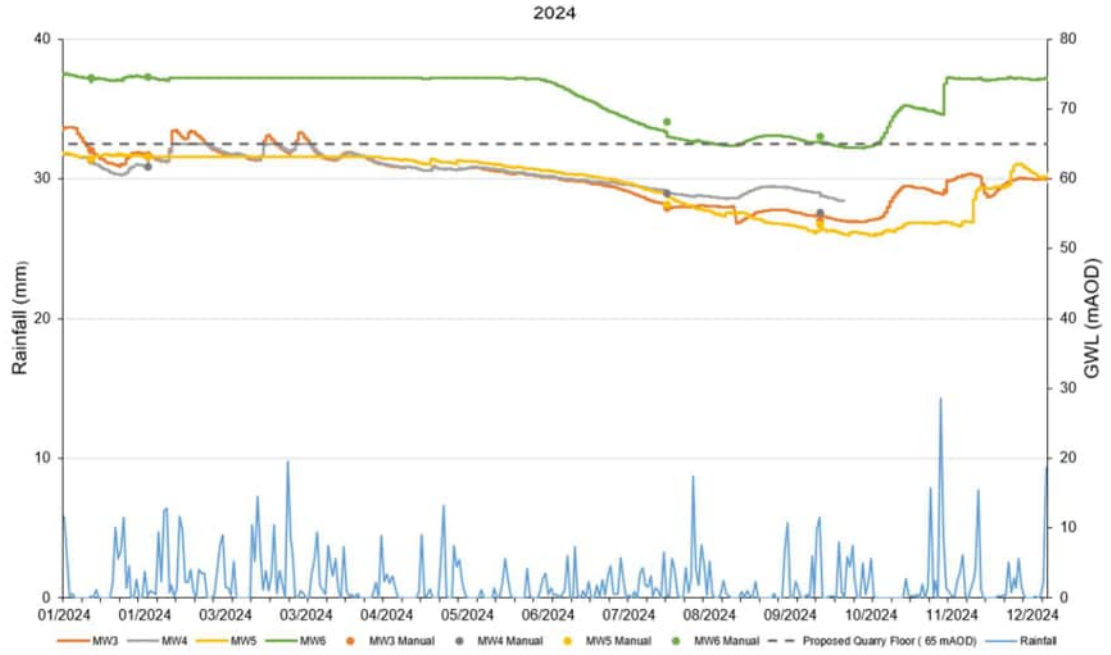


Chart 3: 2025 (January – April) Groundwater levels at on-site monitoring boreholes and on-site rainfall

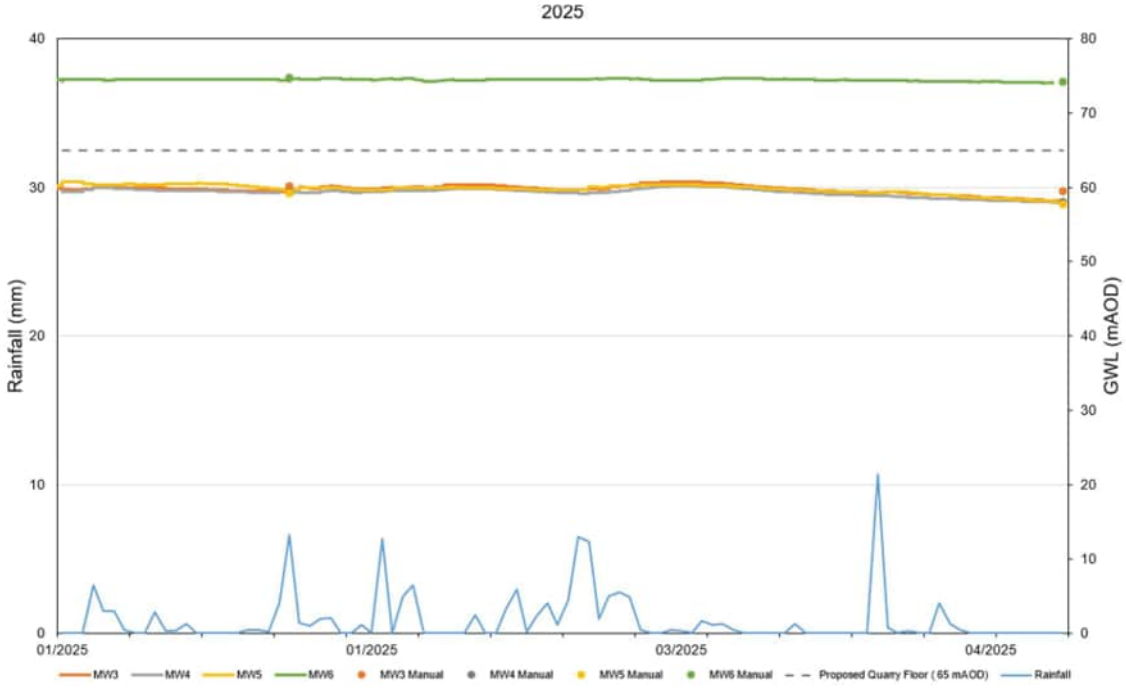
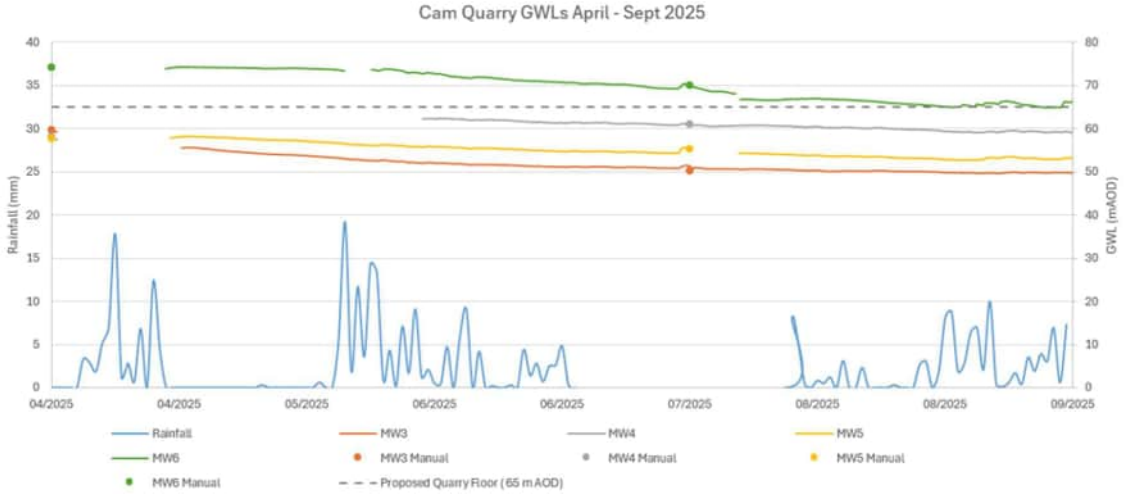


Chart 4: 2025 (April – September) Groundwater levels at on-site monitoring boreholes and on-site rainfall



2.2 Conclusion

The recorded groundwater levels (up to 75mOD) in monitoring borehole MW6 located at the northern boundary of the overall site are an outlier showing water levels c. 10 metres above the other three monitoring boreholes MW3, MW4 and MW5. It should be noted that no groundwater inflows have been observed in the vicinity of the current quarry floor level at 70mOD in the north of the extraction area closest to monitoring borehole MW6, some 5 metres below the recorded groundwater level of 75mOD.

The long term groundwater levels recorded in monitoring boreholes MW3, MW4 and MW5 over a two year monitoring period (August 2023 to September 2025) are below 65 mOD, except for some short periods at borehole MW3 (located over c. 468 metres south of the quarry extraction area) where the levels rise 1 -2 metres in response to rainfall. The average groundwater level in these monitoring boreholes is below c. 61mOD. There is a seasonal fluctuation in groundwater levels of up to c. 13 metres, with the lowest groundwater level of c. 50mOD being recorded.

On this basis, the proposed quarry floor level of 65mOD will not require dewatering operations within the quarry extraction area.

3.0 Proposed Quarry Floor Level

3.1 Existing Quarry Floor Level

The existing floor level ranges from c. 62 to 65 mOD in the sump / infiltration area; c. 70 mOD in the northern extraction area and c. 85 mOD in the southern extraction area, refer to **Drawings ACP-1** Existing Site Layout (August 2026) and **ACP-3** Existing & Proposed Cross Sections.

Roadstone have not observed any groundwater inflows within the existing quarry extraction area and there are no dewatering operations. Surface water run-off is captured in the existing sump / infiltration area and infiltrates naturally to ground.

3.2 Proposed Quarry Floor Level

Based on the assessment of groundwater levels in **Section 2.0** above the proposed quarry floor level has been raised from its original level of 40 mOD to 65 mOD to eliminate the need for dewatering operations.

The proposed quarry floor level and water management infrastructure (refer to **Section 4.0** below) are shown on **Drawings ACP-2** Proposed Site Layout and **ACP-3** Existing & Proposed Cross Sections.

3.3 Quarry Dewatering (Worst Case Precautionary Assessment)

The proposed quarry floor level of 65 mOD has been assessed to eliminate the need for quarry dewatering, refer to **Section 2.2** above.

However, to address the concerns raised by Roscommon Co. Council and on a worst case precautionary basis, the potential impact of dewatering assuming long term groundwater levels at 67.5 mOD and 75.5 mOD, and using the proposed quarry floor level of 65 mOD has been assessed.

3.3.1 Hydraulic Conductivity

In hard rock aquifers the hydraulic conductivity is controlled by the rock mass structure. The quarry is located within aquifer classified as Regionally Important Karstified (Rkc) Aquifer – Bedrock refer to EIAR Figure 7-4.

Estimates of bulk hydraulic conductivity for Rkc aquifers have been published in the Irish Aquifer Properties – A Reference Manual and Guide (EPA, GSI – March 2015), refer to extract from **Table 5** provided below:

Table 5: A Reference Manual and Guide (EPA, GSI – March 2015)

Aquifer Category	Bulk Hydraulic Conductivity
Rkc	0.53 m/day (6.1×10^{-6} m/sec)

A hydraulic conductivity of 6.1×10^{-6} m/sec, as a reasonable representation of the bulk rock mass hydraulic conductivity has used for the assessment.

3.3.2 Estimated Zone of Influence / Potential Long Term Groundwater Level Drawdown

The zone of influence of the potential dewatering operations has been estimated using the Sichardt equation:

$R = 3000 \times h \times \sqrt{k}$

Where:

- R = limit of zero drawdown from the extraction area boundary (m)
- h = groundwater drawdown (m)
- k = hydraulic conductivity or permeability (m/sec)

On a precautionary basis, assuming long term groundwater level (GWL) drawdowns, h, of 2.5m (from 67.5 to 65.0 mOD) and 10.5 m (from 75.5 to 65.0 mOD); and the bulk hydraulic conductivity value of 6.1×10^{-6} m/sec referenced above; the zone of influence of any potential quarry dewatering to the proposed floor level of 65 mOD has been estimated as follows:

Table 6: Estimated Zone of Influence (Extraction to 65 mOD) – GWL Drawdown h = 2.5m & 10.5m

Rock Mass Bulk Hydraulic Conductivity	Estimated Zone of Influence (GWL Drawdown h = 2.5 m) : From Extraction Boundary to Zero Drawdown (m)	Estimated Zone of Influence (GWL Drawdown h = 10.5 m) : From Extraction Boundary to Zero Drawdown (m)
6.1×10^{-6} m/sec	18.5 m from extraction boundary	77.8m from extraction boundary

On this precautionary basis, the zone of influence for any potential dewatering associated with extraction to 65 mOD is estimated to range from c. **19** to **78** metres from the quarry extraction boundary, refer to **EIAR Figure7-7 Rev A** enclosed. The extent of these estimated Zones of Influence associated with the potential drawdown are very small, effectively contained within the overall site boundary. Based on experience of groundwater inflows at other limestone quarries, and the proposed extraction area, the volume of groundwater inflow at these potentially shallow groundwater drawdown levels could be up to c. 200 m^3 per day. This potential volume is small compared to the overall surface water runoff volumes accommodated in the water management design below, and is covered by the conservative design parameters (20% climate change allowance; 10% addition to surface run-off areas etc.).

3.3.3 Potential Impact on Groundwater Body / Bedrock Aquifer

The area within the potential zone of influence , ZoI for R = c. **80 m** worst case from the quarry extraction area boundary, for extraction to a level 65mOD, is c. 0.31km2 including the quarry area. This is shown on **EIAR Figure 7.7 Rev A** Source Protection Areas enclosed.

In context of the Suck groundwater body (c. 1,099 km2) , the potential ZoI area equates to less than 0.03% of the overall groundwater body. The potential impact on the groundwater body (bedrock aquifer) is insignificant.

The potential zone of influence would not impact on any private water supply; public water supplies (including the source protection area for the Killeglan PWS Tobermore Spring, refer to **Figure 7-7 Rev A**); or any European site.

4.0 Quarry Water Management Infrastructure

4.1 Existing Quarry

As stated in **Section 2.0** there is no groundwater inflow into the existing quarry and there is no dewatering required for the ongoing quarry operations. Surface water run-off drains by gravity and is captured in the existing sump / infiltration area where infiltrates naturally to ground, refer to **Drawing ACP-1** Existing Site Layout and **ACP-3** Cross Sections. Water quality sampling and testing has been carried out in the existing sump / infiltration area in September 2025, refer to **EIAR Chapter 7 Water**. The recorded suspended solids level in the sump / infiltration area water sample tested was very low - 7.75 mg / litre.

4.2 Proposed Quarry Water Management

It is proposed to implement the following quarry water management as part of the current planning application (refer to **Drawings ACP-2** Proposed Site Layout and **ACP-3** Cross Sections):

1. Construction of a Barrier Berm

A barrier berm will be constructed at the base of the access ramp leading to the lowest extraction bench, adjacent to the groundwater discharge area in the south-western corner of the quarry.

The purpose of the berm is to prevent surface water runoff potentially containing suspended solids from entering the sump / infiltration area directly.

Similarly, a 20 m-wide block of in situ rock will be retained along the northern boundary of the sump / infiltration area to provide an additional barrier against surface water runoff entering the area during quarry extraction at the proposed final level of 65 m AOD.

These design measures will create a dedicated enclosure around the groundwater discharge area, effectively separating it from the operational quarry. As a result, only treated, clean water will be permitted to enter the sump / infiltration area.

2. Collection of Runoff in Lagoon 1

Surface water runoff generated within the active extraction area will be directed to Lagoon 1, which will function as the primary collection and containment pond. Lagoon 1 will be lined, refer to sections below and **Drawing ACP-5** / **ACP-6** for detailed design.

The lagoon will allow the initial settlement of coarse suspended solids and provide temporary storage of runoff generated within the quarry workings before being pumped to Lagoon 2 for treatment.

3. Transfer to Lagoon 2 for Secondary Treatment

Water collected within Lagoon 1 will be pumped via pipeline to Lagoon 2, located at surface level. Two pumps will be employed at Lagoon 1, one acting as the duty pump and one as a stand-by. The pumps, along with the associated generator and bunded fuel storage tank will be housed on a sealed concrete pad with bunded kerb to direct any rainfall over the pad to the lined Lagoon 1.

Lagoon 2 will be lined, and function as a secondary settlement lagoon and will provide additional retention time to facilitate the removal of sediment prior to reuse or discharge, refer to sections below and **Drawings ACP-5** / **ACP-6** for detailed design.

4. **Water Reuse within Quarry Operations**

Lagoon 2 will serve as the principal water storage reservoir for the quarry. Stored water will be reused within site operations for the following purposes:

a. Wheelwash Supply

Water stored within Lagoon 2 will be used to supply the existing wheelwash facility. This will minimise the requirement to use water from the mains supply for wheelwash operations.

b. Dust Suppression

Stored water will provide a reliable year-round source of water for dust suppression activities throughout the quarry. This will minimise the requirement to use water from the mains supply during periods of dry weather when water is not naturally available within the quarry void.

5. **Controlled Discharge of Treated Water**

A water level monitoring system and automated control valve will be installed within **Lagoon 2**. When water levels exceed a predefined operational threshold, surplus water will be discharged under controlled conditions (using a hydrobrake) via a gravity-fed pipeline to the existing Sump / Infiltration Area in the south-western corner of the quarry.

Prior to discharge, the water will pass through a Class 1 hydrocarbon interceptor to ensure the removal of any residual hydrocarbons.

This system **will ensure that only clean, treated water is discharged to ground** in the sump / infiltration area and will provide an additional robust level of environmental protection for the underlying groundwater and any related pathways to European sites.

The proposed water management infrastructure is well established and proven practice / technology implemented by Roadstone at other locations.

Whilst it is demonstrated that the quarry has residual storage capacity with respect to storm events, should it be deemed necessary by the Competent Authority and as an additional layer of precaution, a condition on any grant of permission could be applied that pumping will stop into the discharge point during red and amber rain weather event warnings.

4.3 Water Management Infrastructure Design

4.3.1 Rainfall

The design is based on rainfall data obtained from the Met Eireann information online calculator, from this the design rainfall data used is:-

- M5-60 = 15.2
- M5 2 day = 56.2
- Ratio R = 0.270

The design has been tested for a 1 in 1, 30 and 100 year storm events with 20% allowance for climate change included for the 1:100 year event.

4.3.2 Runoff areas and coefficients

The total areas input into the design are:-

- 11.424ha for the quarry base
- 0.427ha into Lagoon 2

- 1.456ha into the infiltration area

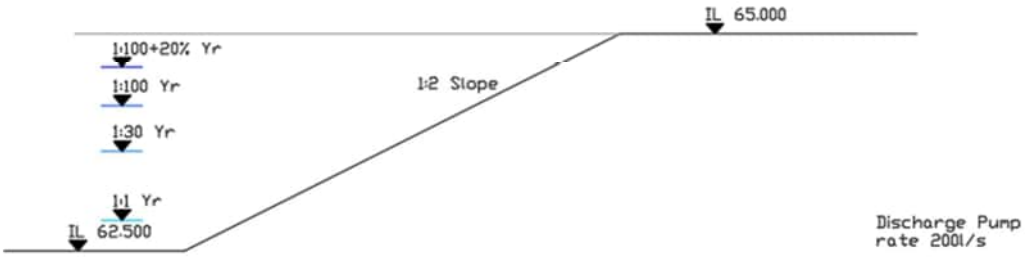
On a precautionary basis an additional 10% has been added to all areas.

The runoff coefficients (Cv) used for the design are 0.75 and 0.84 for summer and winter storms respectively.

4.3.3 Collection - Lagoon 1

Lagoon 1 has been modelled as a 2.5m deep lagoon with 1:2 side slopes, the base area is 1,660m^2 and the top of bank area is 2,400m^2, refer to planning / design **Drawings ACP-5** and **ACP-6**. The lagoon footprint is 60m by 40m. The discharge from the lagoon is via pumps set at 200l/s. The lagoon has a freeboard of c. 0.4 metre during a 1:100 +climate change (CC) storm event.

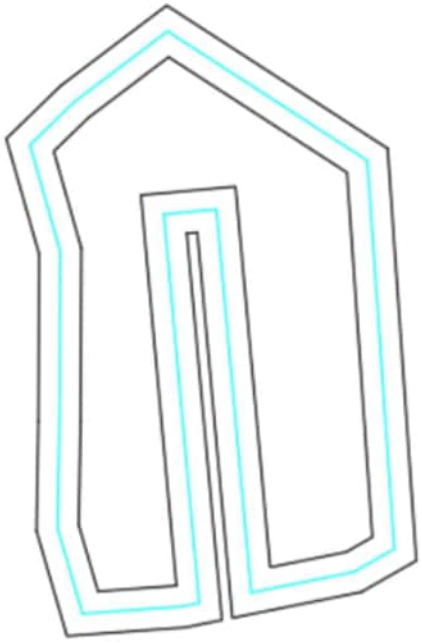
RP	Max Water Level
1	62.851
30	63.643
100	64.166
100 +20%	64.609

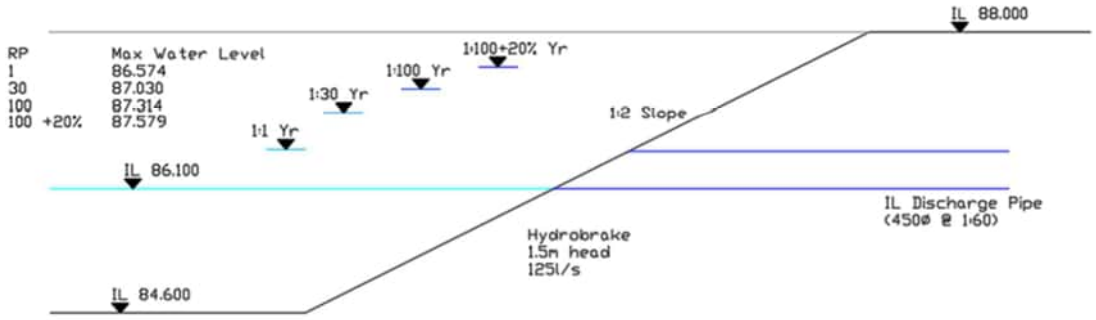


4.3.4 Settlement Treatment & Attenuation – Lagoon 2

Lagoon 2 has been modelled as a 3.4m deep lagoon with 1:2 side slopes, the base area is 2885m^2 and the top of bank area is 3930m^2, refer to planning /design **Drawings ACP-5** and **ACP-6**. The discharge from the lagoon is via a hydrobrake set for 125l/s at 1.5m head.

It is proposed to provide a further 1.5m depth below the outlet to allow for water storage for use on the site.





4.3.5 Hydrocarbon Interceptor

The discharge from the site will be via. a 450mm diameter pipe to a Class 1 full retention hydrocarbon separator sized for a flow rate of 125l/s (SPEL Ref: P125 1CSC, Diameter2.7m, Length 8.58m or similar). The discharge from the separator will flow by gravity to the existing infiltration area in the southwest corner of the site.

4.3.6 Settlement Treatment

The collection lagoon (Lagoon1) has a base area of c. 1,660m^2 and the settlement lagoon (Lagoon 2) has a base area of c.2,885 m^2 giving a total surface area of 4,545 m^2.

The required lagoon surface area to settle out silt size particles (diameter 0.01 mm) based on a discharge of 125 litres / second is 812 m^2, based on National Coal Board Guidance On this basis the proposed settlement lagoon (Lagoon 2) has more than sufficient treatment capacity to remove / settle out silt size particles prior to being piped via Class 1 hydrocarbon separator to the infiltration area for discharge to ground.

4.3.7 Infiltration Area

The Causeway Flow models show that the infiltration area at the site has sufficient storage to deal with a 1:100 year storm event with 20% allowance for climate change followed 24 hrs later by a 1:30 year storm event (refer to **Appendix A**).

The existing sump / infiltration area covers an area of 6,000 square metres and has a volume of c. 16,000 cubic metres. A smaller sump / infiltration area and volume of c. 4,900 m^2 and 14,700 m^3 has been modelled on a conservative basis.

4.3.7.1 Sump / Infiltration Area - Storage Requirement: Overall Water Balance

A simple water balance model has been constructed using rainfall and evaporation data from a nearby meteorological station (Mt Dillion) and site specific data (quarry extraction area, rock mass bulk hydraulic conductivity / permeability and quarry sump / infiltration area geometry).

The model uses average annual rainfall and evaporation data to assess the likely variation in water storage required in the quarry sump / infiltration area. The requirements for storm events are set out in Section 4.3.6.2 below.

The following input data are used:

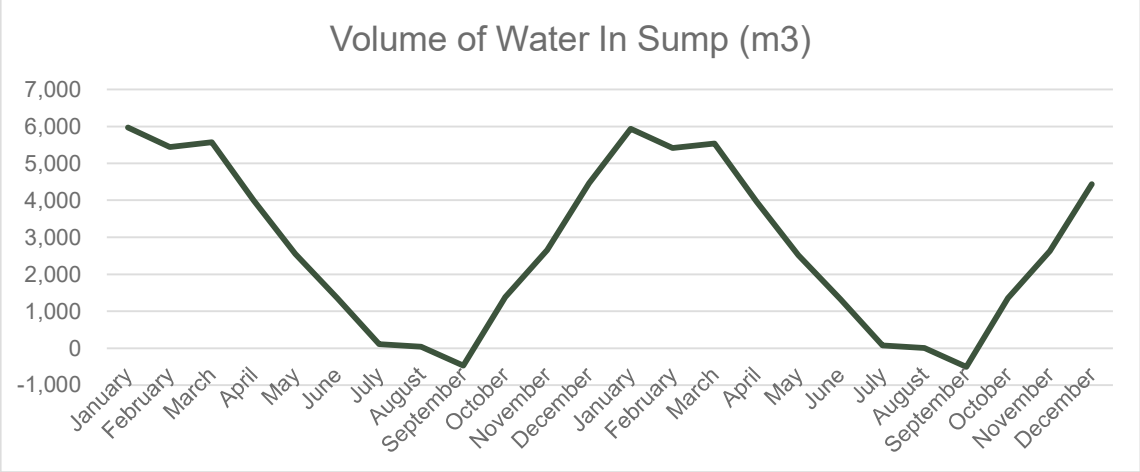
- Quarry Area : 129,000 (m^2) (the proposed maximum quarry extent);
- Monthly rainfall / runoff coefficient : 0.55 (dim);
- Average Annual Rainfall (1981 – 2010) : 1,047 mm/yr;
- Average Annual Evaporation (2023 – 2026) : 703.6 mm/yr;
- Bulk hydraulic conductivity / infiltration rate: 6.1 x $^{10-6}$ m/sec

The model has been run monthly for a period of 2 years. Steady state conditions are reached within this period.

The model shows the average annual volume of water derived from incident rainfall onto the quarry and to be managed in the quarry water management infrastructure area is of the order of 74,000m^3. The same volume of water is discharged over the course of one year via infiltration to groundwater (71,000m^3) or lost to evaporation from the sump (3,000m^3). Given the small area of the sump / infiltration area compared to the extent of the bedrock aquifer unit beneath the site the loss to evaporation is insignificant and will have no effect on local or regional groundwater levels, yield or flow direction.

The modelling shows that in the winter months excess runoff is generated and water needs to be stored in the sump / infiltration area. The water level falls in the sump / infiltration area during the drier summer months before the volume of water storage then increases again. This is consistent with observations in the existing quarry. In the winter months approximately 6,000m^3 of water storage is required to contain excess winter rainfall. This is well within the sump / infiltration area volume of c. 16,000 m^3. **Diagram 1** shows the annual water storage requirements.

Diagram 1 – Water Balance Output : Water Storage Required in Quarry Sump / Infiltration Area



As the water balance model has been constructed using a monthly timestep and using average rainfall and evaporation values there will be variation from the model results presented from year-to-year. For example, in a particularly wet year slightly more water storage will be required, and conversely, in a drier than average year less water storage will be required.

The water balance model does however confirm that the compared to the extent of the quarry and the depth of the proposed quarry floor at 65 mOD that there is ample space / volume within the sump / infiltration area to manage water within the quarry.

4.3.7.2 Sump / Infiltration Area Storage Requirement - Storm Events

The infiltration area capacity has been checked for the various storm events, using an infiltration rate of 6.1 x 10^{-6} m/sec (rock mass bulk hydraulic conductivity, refer to Section 3.3.1 above. The estimate water depth and infiltration volume are summarised in **Table 7** below:

Table 7: Sump / Infiltration area Storage Requirements – Storm Events

Return Period (1:x)	Infiltration Area Water Depth (m)	Infiltration Volume (m3)	Infiltration rate (l/s)
1	0.520	2,549	20.5
30	1.404	6,882	21.5
100	1.873	9,180	22.0
100+20%	2.402	11,772	22.7

The existing sump / infiltration area (c. 16,000 m3) has sufficient capacity to accommodate these storm volumes.

4.3.8 Section 4 discharge Licence

Roadstone Ltd. are in the process of submitting a Section 4 discharge licence application to Roscommon County Council based on the water management infrastructure design described above.

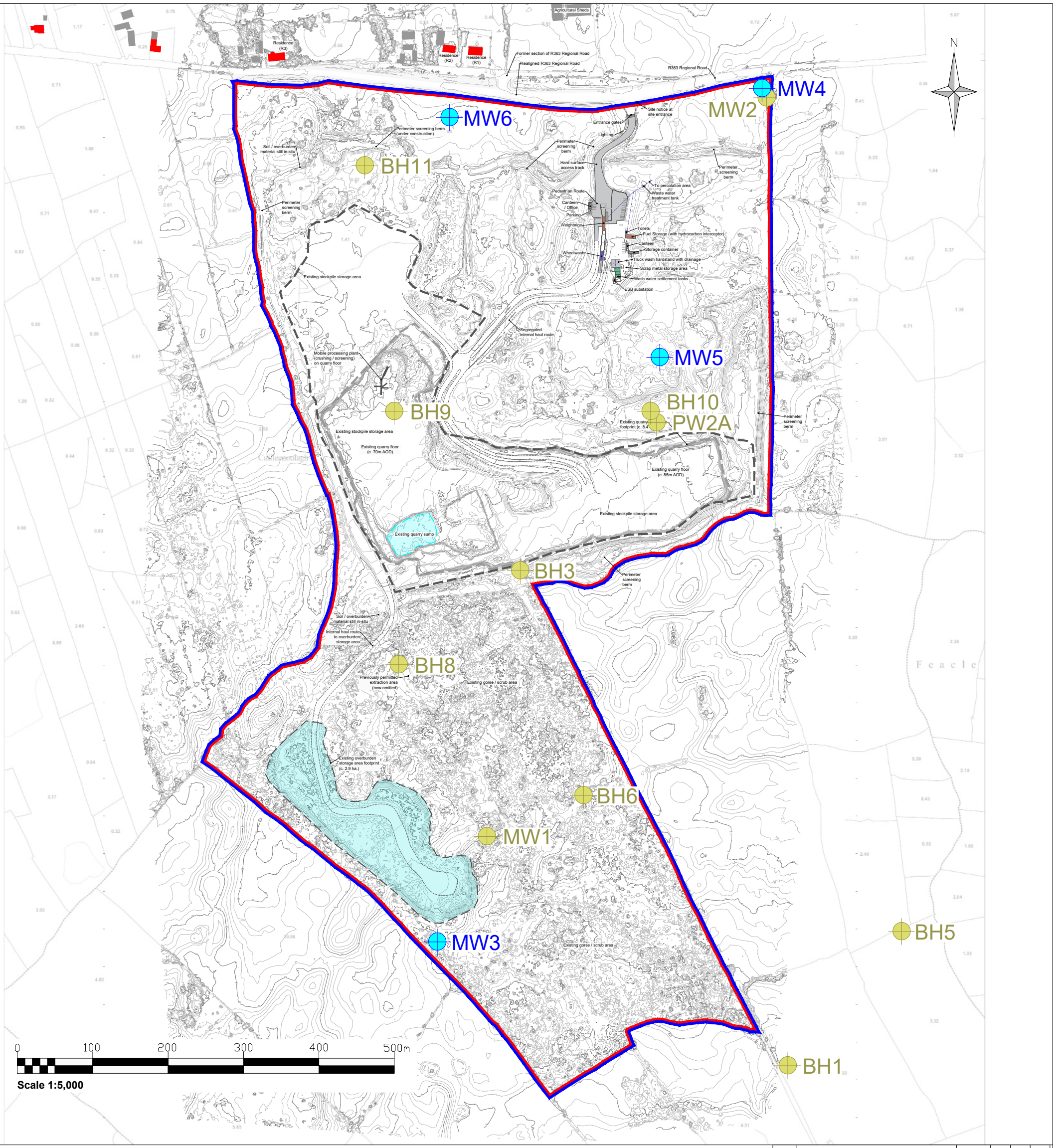
5.0 Water Environment Monitoring Programme

As outlined in the Mitigation and Monitoring Measures (EIAR Chapter 16), the following water monitoring programme is proposed for the site as outlined in **Table 8**. However, the previously proposed surface water monitoring at the discharge point to the Ballyglass River will be replaced by monitoring of treated water at the discharge point to the on-site quarry sump / infiltration area, following collection at Lagoon 1, treatment through Lagoon 2 and passing through the Class 1 hydrocarbon interceptor.

Table 8: Indicative Schedule of Environmental Monitoring for Water

Activity (Responsibility)	Q1			Q2			Q3			Q4		
	J	F	M	A	M	J	J	A	S	O	N	D
Continual Groundwater Level in 4 boreholes MW3, MW4, MW5, MW6 with loggers (Contracted Consultant)	logger	logger	logger	logger	logger	logger	logger	logger	logger	logger	logger	Logger
Quarterly Groundwater Quality in 4 boreholes MW3, MW4, MW5, MW6 (Contracted Consultant)												
Monthly Treated Water Discharged to Infiltration Area at location between hydrocarbon interceptor and water entering the infiltration area in the SW corner of quarry – location of discharge to ground (Contracted Consultant) **Note** – only when treated water is being discharged to the infiltration area												

Figures



Scale 1:5,000

Notes:

1. Based on 6 inch scale Tailte Eireann Discovery raster maping RN047, RN048, RN050, RN051

Legend:

- Landholding (c. 66.3 hectares)
- Planning Application Area (c. 66.3 hectares)
- Existing Extraction Area (c. 8.4 hectares)
- Proposed Extraction Area (c. 12.9 hectares)
- Area part of Planning Permission 04/1479 & ABP PL20.215417 (c. 1.7 hectares) over which the public road was realigned
- Area of existing overburden storage (c. 2.9 hectares)
- Residence Locations
- Concrete hard surface areas
- Ancillary Site Facilities
- Contours (1m interval)
- 2023 Boreholes - Current Groundwater Monitoring Well Locations Locations
- 2003-2004 Boreholes - Decommissioned

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: Roadstone Limited

Project: Continued Use of Existing Cam Quarry at Curry & Cloonacaltry townlands, Co. Roscommon

Figure Title: Onsite Borehole Locations Map

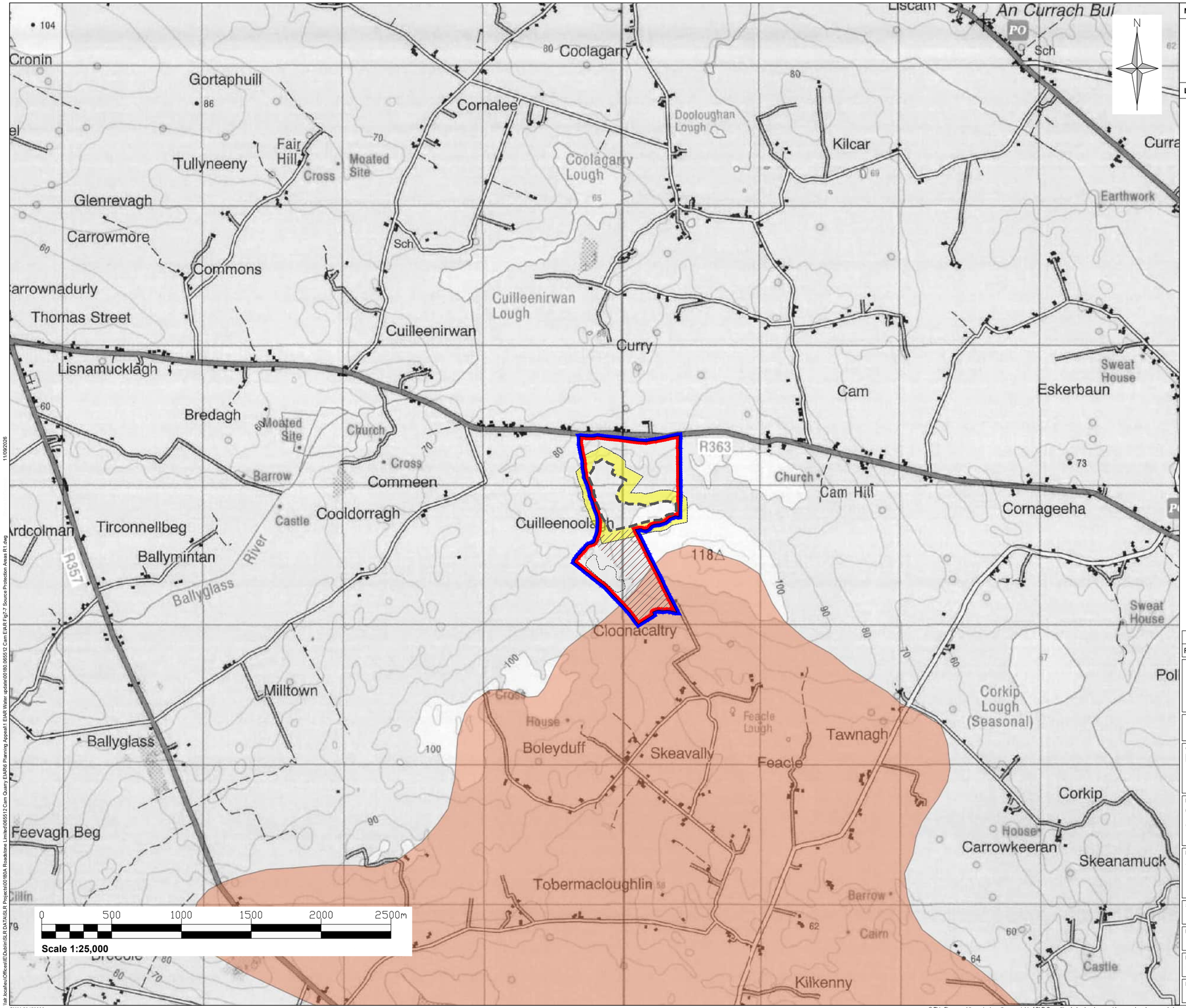
Scale	SLR Project No.
1:5,000 @ A3	501.065512.00001

Designed	Drawn	Checked	Authorised
mcob	mcob	pg	pg
Date 04/26	Date 04/26	Date 04/26	Date 04/26

Figure Number: **Figure 7-1** Rev. **0**

\\slr.local\eu\Offices\IE\Dublin\SLR DATA\SLR Projects\00180A Roadstone Limited\065512 Cam Quarry EIAR6 Planning Appeal\1 EIAR Water update\00180_065512 Cam EIAR Fig7-1 Borehole Locations R1.dwg 11/09/2026

CYAL50522699



Notes:

1. Based on 6 inch scale Tailte Eireann Discovery raster maping RN047, RN048, RN050, RN051

Legend:

- Landholding (c. 66.3 hectares)
- Planning Application Area (c. 66.3 hectares)
- **Proposed Final** Extraction Footprint (c. 12.9 hectares)
- Non-Development Area
- Zone of Influence extending c. 80m from Extraction Area: GWL Drawdown 75m - 65m AOD (Precautionary Assessment) - refer to EIAR Addendum Chapter 7 (September 2026)
- Public Water Supply Source Protection Area
  Killeglan PWS Tobermore Spring

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: Roadstone Limited

Project: Continued Use of Existing Cam Quarry at Curry & Cloonacaltry townlands, Co. Roscommon

Figure Title: Source Protection Areas

Scale		SLR Project No.
1:25,000	@ A3	501.065512.00001

Designed	Drawn	Checked	Authorised
mcob	mcob	pg	pg
Date	Date	Date	Date
09/26	09/26	09/26	09/26

Figure Number: **Figure 7-7 (Rev A)** Rev. **A**

11/09/2026

\\dir.local\ie\Office\IE\Dublin\SLR DATA\SLR Projects\00180A Roadstone Limited\065512 Cam Quarry EIAR\6 Planning Appeal\1 EIAR Water update\00180.065512 Cam EIAR Fig7-7 Source Protection Areas R1.dwg

CYAL50450233

Appendices

Appendix A
Water Management Infrastructure Design
Causeway Flow Models

Causeway	SLR Consulting Limited	File: 260910 501_065512_00001 - Network: Quarry SW Ian Roberts 10/09/26	Page 1 Roadstone Limited Cam Quarry 501.065512.00001

MODEL: UP TO 1:100 YR STORM EVENT WITH 20% CLIMATE CHANGE ALLOWANCE + FURTHER 10% ALLOWANCE.

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	15.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.270	Preferred Cover Depth (m)	0.600
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Lagoon 1	11.424	5.00	65.000		590063.688	744760.119	2.500	62.500
Pump Chamber			65.000	1200	590073.412	744762.451	3.000	62.000
Lagoon 2 - Inlet			88.000	1200	590218.022	744966.040	1.900	86.100
Laggon 2 - Outlet	0.427	5.00	88.000	1350	590182.578	744970.250	1.900	86.100
Oil Separator			88.000	1350	590172.359	744962.094	2.170	85.830
Soakaway area	1.456		68.000	1350	589950.403	744767.661	3.000	65.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	Lagoon 1	Pump Chamber	10.000	0.600	62.500	62.335	0.165	60.6	300	5.08	34.0
1.002	Pump Chamber	Lagoon 2 - Inlet	249.721	0.600	62.000	86.100	-24.100	-10.4	300	30.00	14.1
1.003	Laggon 2 - Outlet	Oil Separator	13.075	0.600	86.100	85.880	0.220	59.4	450	5.08	34.0
1.004	Oil Separator	Soakaway area	295.074	0.600	85.830	65.000	20.830	14.2	450	5.99	31.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.001	2.023	143.0	1053.4	2.200	2.365	11.424	0.0	300	2.049
1.002	0.012	0.8	437.3	2.700	1.600	11.424	0.0	300	0.000
1.003	2.641	420.0	39.4	1.450	1.670	0.427	0.0	92	1.680
1.004	5.422	862.4	37.0	1.720	2.550	0.427	0.0	63	2.765

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	10.000	60.6	300	Circular	65.000	62.500	2.200	65.000	62.335	2.365
1.002	249.721	-10.4	300	Circular	65.000	62.000	2.700	88.000	86.100	1.600
1.003	13.075	59.4	450	Circular	88.000	86.100	1.450	88.000	85.880	1.670
1.004	295.074	14.2	450	Circular	88.000	85.830	1.720	68.000	65.000	2.550

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	Lagoon 1		Junction		Pump Chamber	1200	Manhole	Adoptable
1.002	Pump Chamber	1200	Manhole	Adoptable	Lagoon 2 - Inlet	1200	Manhole	Adoptable
1.003	Laggon 2 - Outlet	1350	Manhole	Adoptable	Oil Separator	1350	Manhole	Adoptable
1.004	Oil Separator	1350	Manhole	Adoptable	Soakaway area	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Lagoon 1	590063.688	744760.119	65.000	2.500					
						0	1.001	62.500	300
Pump Chamber	590073.412	744762.451	65.000	3.000	1200	1	1.001	62.335	300
						0	1.002	62.000	300
Lagoon 2 - Inlet	590218.022	744966.040	88.000	1.900	1200	1	1.002	86.100	300
Laggon 2 - Outlet	590182.578	744970.250	88.000	1.900	1350				
						0	1.003	86.100	450
Oil Separator	590172.359	744962.094	88.000	2.170	1350	1	1.003	85.880	450
						0	1.004	85.830	450
Soakaway area	589950.403	744767.661	68.000	3.000	1350	1	1.004	65.000	450

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	1440
M5-60 (mm)	15.200	Additional Storage (m³/ha)	0.0
Ratio-R	0.270	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0	100	0	10	0
30	0	10	0	100	20	10	0

Node Pump Chamber Online Pump Control

Flap Valve	x	Invert Level (m)	62.000	Switch off depth (m)	0.001
Replaces Downstream Link	✓	Switch on depth (m)	0.100		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	200.000	2.500	200.000

Node Laggon 2 - Outlet Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	86.100	Product Number	CTL-SHE-0427-1250-1500-1250
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.450
Design Flow (l/s)	125.0	Min Node Diameter (mm)	0

Node Lagoon 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	62.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	208

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1500.0	1500.0	2.500	2400.0	2480.3

Node Laggon 2 - Outlet Pond Storage Structure

Invert Level (m)	86.100	Time to half empty (mins)	450	Analyse flow through structure	x

Inlets

Lagoon 2 - Inlet

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2610.0	1.900	3930.0

Node Soakaway area Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02196	Safety Factor	1.5	Invert Level (m)	65.000
Side Inf Coefficient (m/hr)	0.02196	Porosity	1.00	Time to half empty (mins)	5144

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	4900.0	4900.0	3.000	4900.0	5740.0

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 97.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Lagoon 1	228	62.851	0.351	194.5	548.5547	0.0000	SURCHARGED
180 minute winter	Pump Chamber	232	62.344	0.344	143.7	0.3896	0.0000	SURCHARGED
720 minute winter	Lagoon 2 - Inlet	570	86.593	0.493	173.5	0.0000	0.0000	OK
720 minute winter	Laggon 2 - Outlet	570	86.574	0.474	104.7	1344.5540	0.0000	SURCHARGED
720 minute winter	Oil Separator	570	85.926	0.096	88.4	0.1373	0.0000	OK
2880 minute winter	Soakaway area	2580	65.520	0.520	71.2	2548.9960	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute winter	Lagoon 1	1.001	Pump Chamber	145.7	2.195	1.019	0.6937
180 minute winter	Pump Chamber	Pump	Lagoon 2 - Inlet	200.0			
720 minute winter	Laggon 2 - Outlet	1.003	Oil Separator	88.4	1.963	0.211	0.5893
720 minute winter	Oil Separator	1.004	Soakaway area	88.4	3.301	0.103	20.9929
2880 minute winter	Soakaway area	Infiltration		20.5			

* NOTE : "SURCHARGED" INDICATES OUTLET PIPE BECOMES SUBMERGED (I.E WATER LEVEL ABOVE CROWN LEVEL OF PIPE). IT HAS NO IMPACT ON LAGOON OPERATION

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Lagoon 1	256	63.643	1.143	452.4	1949.5170	0.0000	SURCHARGED
240 minute winter	Pump Chamber	256	63.202	1.202	201.5	1.3595	0.0000	SURCHARGED
960 minute winter	Lagoon 2 - Inlet	825	87.056	0.956	200.0	0.0000	0.0000	OK
960 minute winter	Laggon 2 - Outlet	825	87.030	0.930	164.2	2773.1980	0.0000	SURCHARGED
480 minute winter	Oil Separator	632	85.944	0.114	124.8	0.1632	0.0000	OK
4320 minute winter	Soakaway area	4020	66.404	1.404	107.2	6882.2630	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute winter	Lagoon 1	1.001	Pump Chamber	201.5	2.862	1.409	0.7042
240 minute winter	Pump Chamber	Pump	Lagoon 2 - Inlet	200.0			
960 minute winter	Laggon 2 - Outlet	1.003	Oil Separator	124.8	2.132	0.297	0.7663
480 minute winter	Oil Separator	1.004	Soakaway area	124.8	2.829	0.145	28.0293
4320 minute winter	Soakaway area	Infiltration		21.5			

Results for 100 year +10% A Critical Storm Duration. Lowest mass balance: 98.05%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Lagoon 1	264	64.166	1.666	593.9	2999.5580	0.0000	SURCHARGED
240 minute winter	Pump Chamber	264	63.726	1.726	203.6	1.9516	0.0000	SURCHARGED
960 minute winter	Lagoon 2 - Inlet	960	87.340	1.240	200.0	0.0000	0.0000	OK
960 minute winter	Laggon 2 - Outlet	975	87.314	1.214	166.3	3728.3040	0.0000	SURCHARGED
180 minute winter	Oil Separator	460	85.944	0.114	124.8	0.1632	0.0000	OK
4320 minute winter	Soakaway area	4260	66.873	1.873	130.2	9180.0340	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute winter	Lagoon 1	1.001	Pump Chamber	203.6	2.891	1.424	0.7042
240 minute winter	Pump Chamber	Pump	Lagoon 2 - Inlet	200.0			
960 minute winter	Laggon 2 - Outlet	1.003	Oil Separator	124.8	2.132	0.297	0.7662
180 minute winter	Oil Separator	1.004	Soakaway area	124.8	2.489	0.145	28.0293
4320 minute winter	Soakaway area	Infiltration		22.0			

Results for 100 year +20% CC +10% A Critical Storm Duration. Lowest mass balance: 97.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Lagoon 1	352	64.609	2.109	659.4	3963.5410	0.0000	SURCHARGED
360 minute winter	Pump Chamber	352	64.168	2.168	202.7	2.4519	0.0000	SURCHARGED
1440 minute winter	Lagoon 2 - Inlet	1290	87.607	1.507	200.0	0.0000	0.0000	OK
1440 minute winter	Laggon 2 - Outlet	1290	87.579	1.479	167.6	4674.7920	0.0000	SURCHARGED
120 minute winter	Oil Separator	420	85.944	0.114	124.8	0.1632	0.0000	OK
4320 minute winter	Soakaway area	4320	67.402	2.402	140.2	11771.6500	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
360 minute winter	Lagoon 1	1.001	Pump Chamber	202.7	2.879	1.418	0.7042
360 minute winter	Pump Chamber	Pump	Lagoon 2 - Inlet	200.0			
1440 minute winter	Laggon 2 - Outlet	1.003	Oil Separator	124.8	2.132	0.297	0.7662
120 minute winter	Oil Separator	1.004	Soakaway area	124.8	2.416	0.145	28.0293
4320 minute winter	Soakaway area	Infiltration		22.7			

APPENDIX A-2

Causeway	SLR Consulting Limited	File: 260910 501_065512_00001 - Network: Quarry SW Ian Roberts 10/09/26	Page 1 Roadstone Limited Cam Quarry 501.065512.00001

Design Settings

MODEL:
CONSECUTIVE RAINFALL CRITICAL STORM DURATION

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	15.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.270	Preferred Cover Depth (m)	0.600
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Lagoon 1	11.424	5.00	65.000		590063.688	744760.119	2.500	62.500
Pump Chamber			65.000	1200	590073.412	744762.451	3.000	62.000
Lagoon 2 - Inlet			88.000	1200	590218.022	744966.040	1.900	86.100
Laggon 2 - Outlet	0.427	5.00	88.000	1350	590182.578	744970.250	1.900	86.100
Oil Separator			88.000	1350	590172.359	744962.094	2.170	85.830
Soakaway area	1.456		68.000	1350	589950.403	744767.661	3.000	65.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	Lagoon 1	Pump Chamber	10.000	0.600	62.500	62.335	0.165	60.6	300	5.08	34.0
1.002	Pump Chamber	Lagoon 2 - Inlet	249.721	0.600	62.000	86.100	-24.100	-10.4	300	30.00	14.1
1.003	Laggon 2 - Outlet	Oil Separator	13.075	0.600	86.100	85.880	0.220	59.4	450	5.08	34.0
1.004	Oil Separator	Soakaway area	295.074	0.600	85.830	65.000	20.830	14.2	450	5.99	31.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.001	2.023	143.0	1053.4	2.200	2.365	11.424	0.0	300	2.049
1.002	0.012	0.8	437.3	2.700	1.600	11.424	0.0	300	0.000
1.003	2.641	420.0	39.4	1.450	1.670	0.427	0.0	92	1.680
1.004	5.422	862.4	37.0	1.720	2.550	0.427	0.0	63	2.765

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	10.000	60.6	300	Circular	65.000	62.500	2.200	65.000	62.335	2.365
1.002	249.721	-10.4	300	Circular	65.000	62.000	2.700	88.000	86.100	1.600
1.003	13.075	59.4	450	Circular	88.000	86.100	1.450	88.000	85.880	1.670
1.004	295.074	14.2	450	Circular	88.000	85.830	1.720	68.000	65.000	2.550

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	Lagoon 1		Junction		Pump Chamber	1200	Manhole	Adoptable
1.002	Pump Chamber	1200	Manhole	Adoptable	Lagoon 2 - Inlet	1200	Manhole	Adoptable
1.003	Laggon 2 - Outlet	1350	Manhole	Adoptable	Oil Separator	1350	Manhole	Adoptable
1.004	Oil Separator	1350	Manhole	Adoptable	Soakaway area	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Lagoon 1	590063.688	744760.119	65.000	2.500					
						0	1.001	62.500	300
Pump Chamber	590073.412	744762.451	65.000	3.000	1200	1	1.001	62.335	300
						0	1.002	62.000	300
Lagoon 2 - Inlet	590218.022	744966.040	88.000	1.900	1200	1	1.002	86.100	300
Laggon 2 - Outlet	590182.578	744970.250	88.000	1.900	1350				
						0	1.003	86.100	450
Oil Separator	590172.359	744962.094	88.000	2.170	1350	1	1.003	85.880	450
						0	1.004	85.830	450
Soakaway area	589950.403	744767.661	68.000	3.000	1350	1	1.004	65.000	450

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Consecutive	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	1440
M5-60 (mm)	15.200	Additional Storage (m³/ha)	0.0
Ratio-R	0.270	Starting Level (m)	
Winter CV	0.840	Check Discharge Rate(s)	x
Additional Area (A %)	0	Check Discharge Volume	x
Additional Flow (Q %)	0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)	Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)
0	4320	100	20	1440		30	0

Node Pump Chamber Online Pump Control

Flap Valve	x	Invert Level (m)	62.000	Switch off depth (m)	0.001
Replaces Downstream Link	✓	Switch on depth (m)	0.100		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	200.000	2.500	200.000

Node Laggon 2 - Outlet Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	86.100	Product Number	CTL-SHE-0427-1250-1500-1250
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.450
Design Flow (l/s)	125.0	Min Node Diameter (mm)	0

Node Lagoon 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	62.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1500.0	1500.0	2.500	2400.0	2480.3

Node Laggon 2 - Outlet Pond Storage Structure

Invert Level (m)	86.100	Time to half empty (mins)	0	Analyse flow through structure	x

Inlets

Lagoon 2 - Inlet

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2610.0	1.900	3930.0

Node Soakaway area Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02196	Safety Factor	1.5	Invert Level (m)	65.000
Side Inf Coefficient (m/hr)	0.02196	Porosity	1.00	Time to half empty (mins)	5144

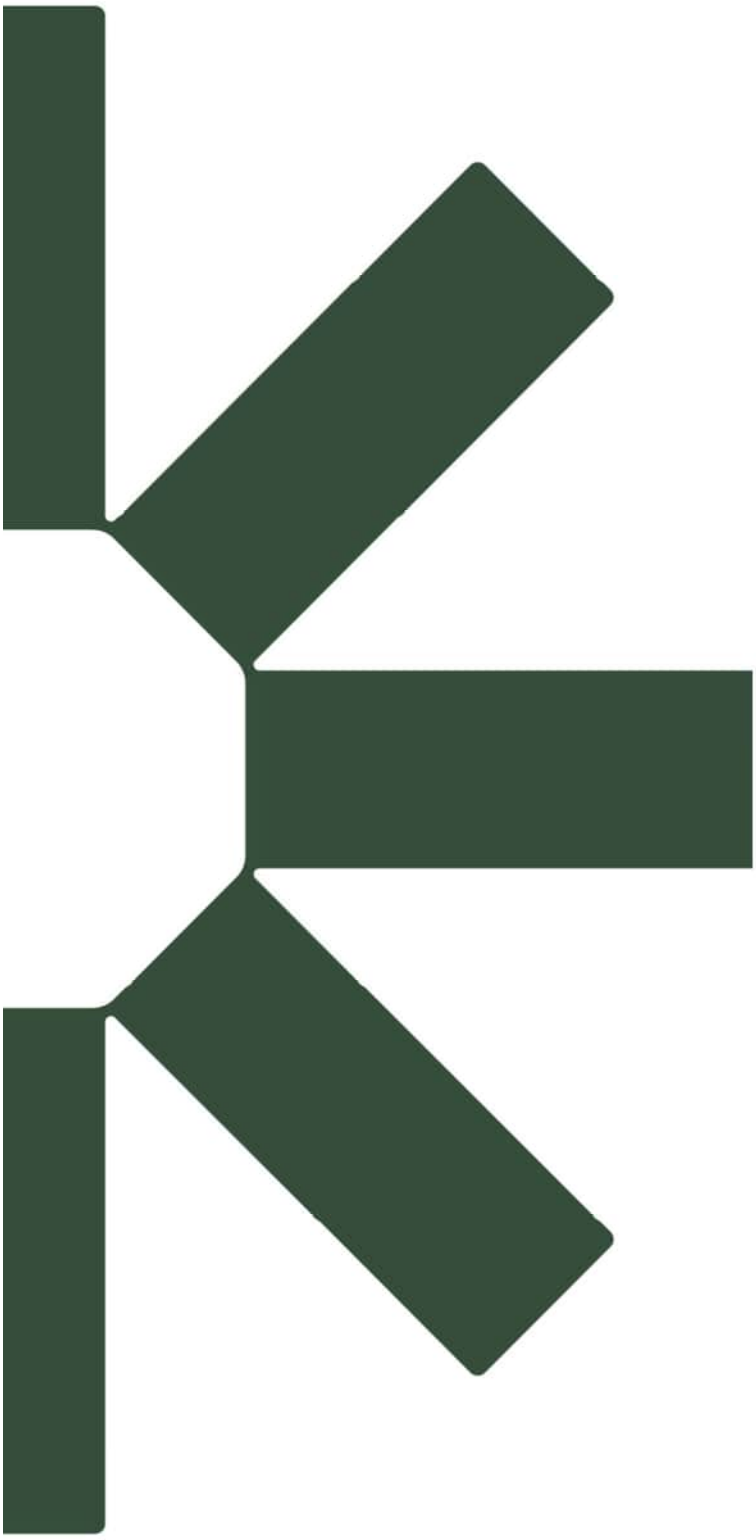
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	4900.0	4900.0	3.000	4900.0	5740.0

Results for Consecutive Rainfall Critical Storm Duration. Lowest mass balance: 98.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320-240	Lagoon 1	6000	63.400	0.900	411.0	1495.0140	0.0000	SURCHARGED *
4320-240	Pump Chamber	6000	62.959	0.959	200.1	1.0841	0.0000	SURCHARGED
4320-720	Lagoon 2 - Inlet	6420	86.975	0.875	200.0	0.0000	0.0000	OK
4320-720	Laggon 2 - Outlet	6420	86.949	0.849	163.6	2509.9380	0.0000	SURCHARGED
4320-720	Oil Separator	6420	85.944	0.114	124.8	0.1632	0.0000	OK
4320-2160	Soakaway area	8040	67.871	2.871	136.3	14073.8100	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
4320-240	Lagoon 1	1.001	Pump Chamber	200.1	2.842	1.400	0.7042
4320-240	Pump Chamber	Pump	Lagoon 2 - Inlet	200.0			
4320-720	Laggon 2 - Outlet	1.003	Oil Separator	124.8	2.132	0.297	0.7663
4320-720	Oil Separator	1.004	Soakaway area	124.8	2.595	0.145	28.0293
4320-2160	Soakaway area	Infiltration		23.2			

* NOTE:
"SURCHARGED" INDICATES OUTLET PIPE BECOMES SUBMERGED (IE. WATER LEVEL ABOVE CROWN LEVEL OF PIPE). IT HAS NO IMPACT ON LAGOON OPERATION



Making Sustainability Happen