Drainage Assessment

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Site: Lismore Church, Lismore, PA34 5UL

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Quality Assurance

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Staff Detail

Initials	Name	Position	Signature
DC	David Clark	Senior Project Manager and Environmental Consultant	
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1. Introduction

1.1 Acknowledgment

1.1.1 This report has been prepared for the sole and exclusive use of Kilmoluag Liosmor in accordance with the scope of work presented, dated 01/07/2024. This report is based on information and data collected by Arthian Ltd (Arthian). Should any of the information be incorrect, incomplete, or subject to change, Arthian may wish to revise the report accordingly.

1.2 Project Understanding

1.2.1 Arthianhave been instructed to evaluate an environmentally acceptable solution for the treatment and disposal of foul drainage for a proposed development at Lismore Church, Lismore, PA34 5UL at NGR NM 86093 43499. The refurbishment of the church may consist of the mixed use of ongoing worship and venue for events, training and performance space.

1.2.2 This report takes into account the following national and local policies:

- National Planning Policy Framework 4 (NPF4) (2023); and
- Argyll and Bute Council Local Development and Planning Policies.

1.3 Limitations

1.3.1 The wider Arthian limitations are contained within Appendix A.

1.4 Introduction to Foul Drainage

1.4.1 The Building (Scotland) Regulations 2004 must be adhered to when a construction project is being undertaken. Regulation 3.7 of the Regulations, as reproduced below, states that:

Every wastewater drainage system serving a building must be designed and constructed in such a way as to ensure the removal of wastewater from the building without threatening the health and safety of the people in and around the building, and:

(a) That facilties for the separation and removal of oil, fat, grease and volatile substances from the system are provided;
(b) That discharge is to a public sewer or public wastewater treatment plant, where it is reasonably practicable to do so; and
(c) Where discharge is to a public sewer or public wastewater treatment plant is not reasonably practicable that discharge is to a private wastewater treatment plant or septic tank.

Limitation

Standard 3.7 (a) does not apply to a dwelling.

1.4.2 As a public sewer connection was not possible a private septic tank/waste-water treatment plant and traditional soakaway infiltration system option was the preferred route to pursue for the treatment and final dispersal of the sewage that would be generated from the proposed development. Section 3.9.1 of

the Technical Handbook requires a preliminary “ground assessment” and this was undertaken by Arthian. The ground assessment results were favourable to allow for a soakaway (see paragraph 3.4 for details).

2. Site Details

2.1.1 The aim of this section of the report is to outline key environmental information associated with the baseline environment.

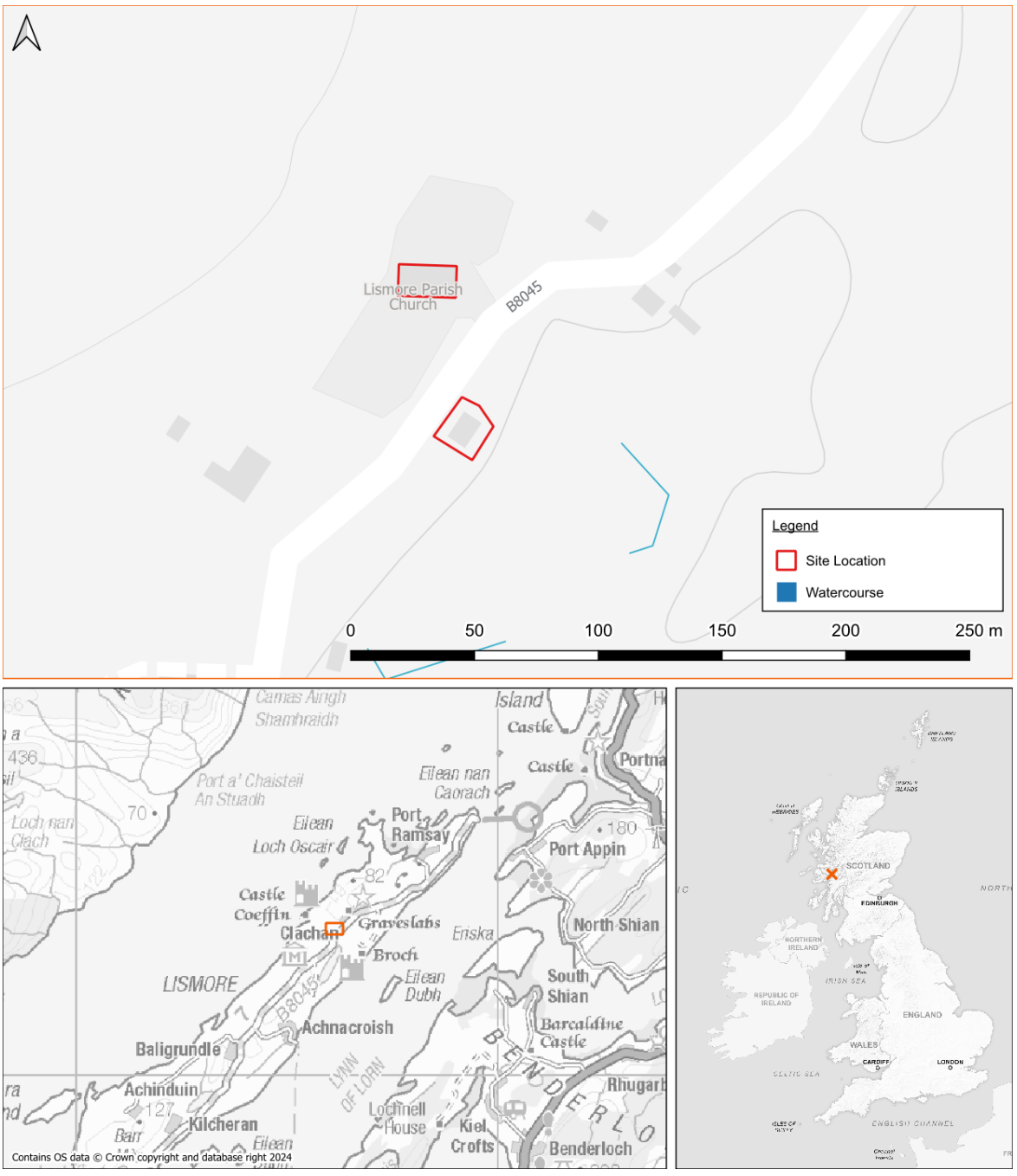


Figure 1: Site Location

2.2 Site Location

2.2.1 The site is located at Lismore Church, Lismore, PA34 5UL at NGR NM 86093 43499.

2.3 Existing Site Conditions

2.3.1 The Parish Church sits within a small, divided enclosure, within a landscape of farmland. The church is surrounded on three sides by graveyard with the east edge bounded by the main road. Beyond the immediate graveyards, there is another remnant of enclosure, which also includes land to the southeast of the site and the manse and garden.

2.3.2 Access to the site is provided from B8045 road.

2.4 Hydrology

2.4.1 The nearest watercourse is a drain to the south-east of the site approximately 85m away from Lismore Church. This flows in a southerly direction and outfalls to the Loch Baile a' Ghobainn.

2.5 Geology

2.5.1 Reference to the British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that most of the site at the church shows no records of the superficial deposits. South-east of the site at the manse indicates the site may be underlain by superficial deposits of Till, Devensian – Diamicton and Alluvium – Clay, silt, sand and gravel (Figure 2). The bedrock deposits are identified as being underlain by described as Lismore Limestone Formation - Metalimestone (Figure 3).

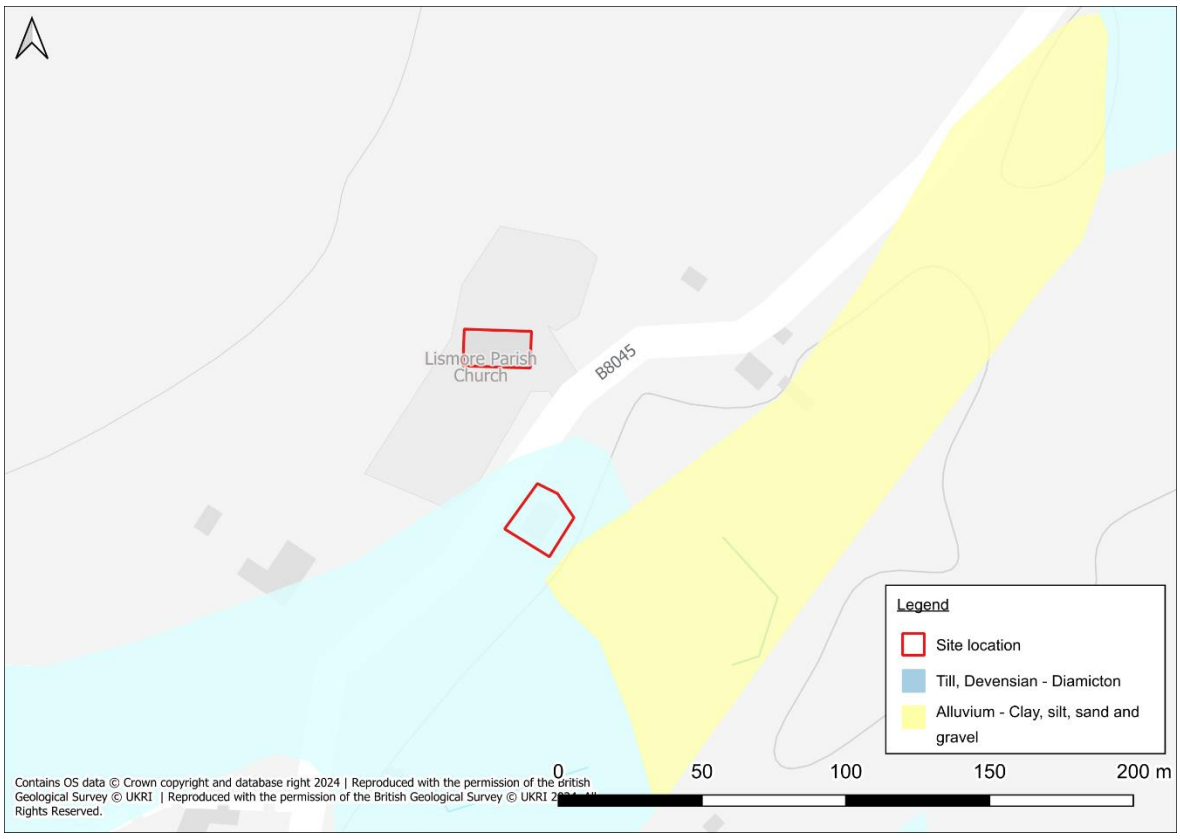


Figure 2: Superficial Deposits

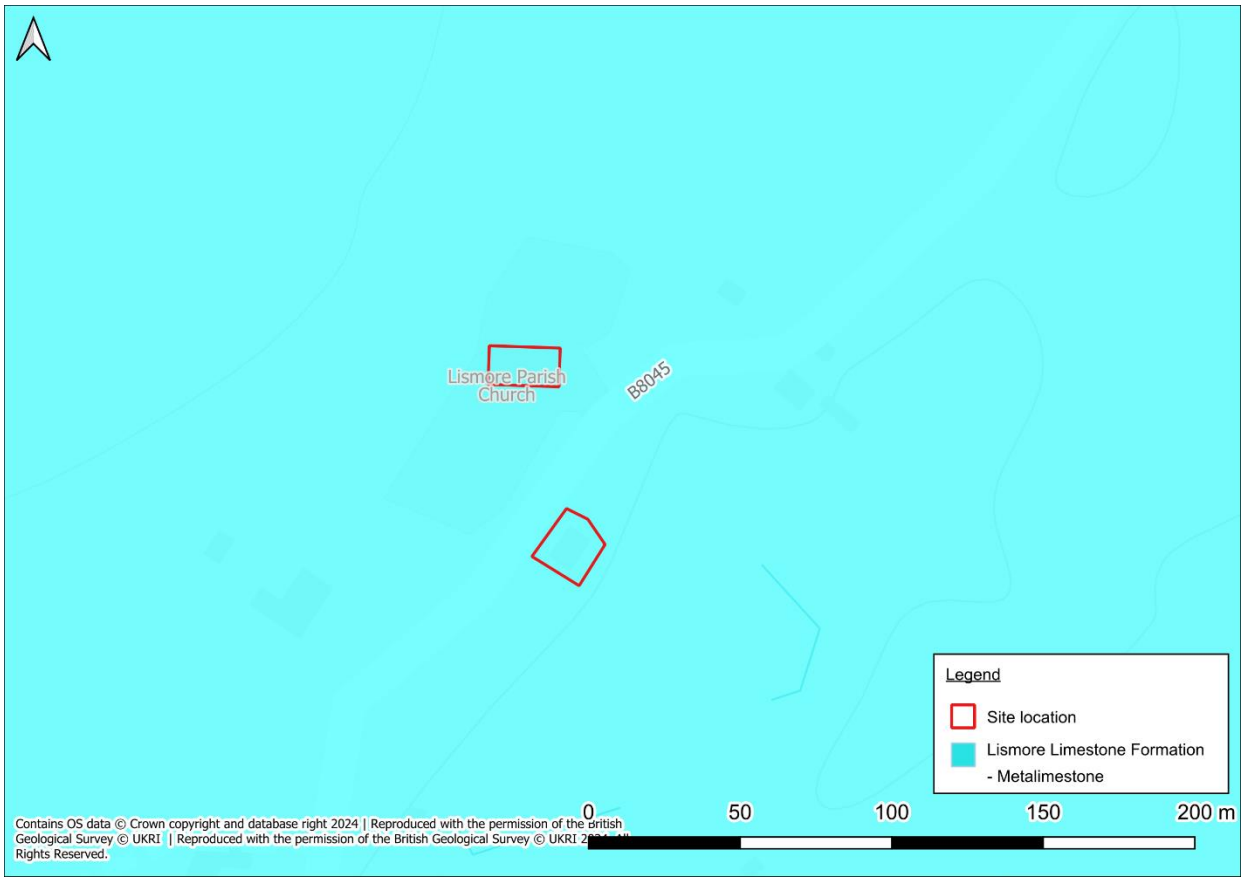


Figure 3: Bedrock Deposits

2.5.2 The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

2.5.3 There are no historical BGS borehole records in proximity of the site.

2.6 Local Drainage

2.6.1 Public sewer records have been obtained from Scottish Water and show that there is a no public sewer in proximity to the site.

2.7 Flood Risk

2.7.1 The SEPA Flood Map identifies the site as being at low risk of flooding from tidal, fluvial and pluvial sources.

3. Site Investigation

3.1 Ground Conditions

3.1.1 Five trial pits were excavated by a mechanical digger on 28 January 2025 to assess the existing soils and their suitability for the use of sub surface soakaways as a method of foul drainage management.

3.1.2 Deposits of clay, silt and gravel were confirmed during Arthian's intrusive investigation.

3.1.3 Bedrock was found close to the surface in three of the trial pits and groundwater was encountered in one of the trial pits excavated.

3.1.4 Trial pit 1, located north-west of the church, consisted of silt and gravel deposits. Therefore, this location was investigated further to explore the option of discharging to a soakaway.

3.2 Location of Services

3.2.1 The developer reportedly knows the locations of all services and any treatment system location would be sited accordingly with due care and attention taken to avoid any inadvertent disturbance during development works.

3.3 Other Implications of Plot Size

3.3.1 Any infiltration device for foul drainage must be located:

- at least 50m from any spring, well or borehole used as a drinking water supply and,
- at least 10m horizontally from any watercourse (including any inland or coastal waters), permeable drain, road or railway.

3.3.2 Any infiltration system and any treatment plant must also be located:

- at least 5m from a building, and
- at least 5m from a boundary.

3.3.3 The location of any septic tank or treatment plant must ensure that a desludging tanker can gain access to a working area that:

- will provide a clear route for a suction hose from the tanker to the tank,
- is not more than 25 m from the tank where it is not more than 4m higher than the invert level of the tank, and
- is sufficient to support a vehicle axle load of 14 tonnes.

3.4 Percolation Testing

3.4.1 Percolation testing for the purpose of evaluating the length and position of a traditional soakaway was undertaken by Arthian on 28 January 2025.

3.4.2 Weather conditions on 28 January 2025 were as follows:

- Approximately 5°C.
- Clear throughout the test.

3.4.3 Five trial pits were excavated with the intent of carrying out a percolation test in accordance with *BS6297:2007: Code of Good Practice for the Design and Installation of Drainage Fields for use in Wastewater Treatment*, see Appendix B. Percolation tests were carried out within one trial pit to the north-west of the church, positioned between the boundary of the scheduled area and graveyard fence. As can be seen below, the percolation test yielded an average percolation value (Vp) of 4.1 sec/mm

PERCOLATION CALCULATOR											
Site:	Lismore Church, Lismore, PA34 5UL										
Date	28.01.25										
TP 1	**0.7m depth**										
Test 1	13:00:00	225	13:09:00	75	00:09:00	150	0	9	0	540	3.6
Test 2	13:10:00	225	13:20:00	75	00:10:00	150	0	10	0	600	4.0
Test 3	13:21:00	225	13:33:00	75	00:12:00	150	0	12	0	720	4.8
										1-3 avg	**4.1**
									SITE AVERAGE Vp		**4.1**

3.4.4 The average percolation value (Vp) of the percolation tests carried out in the trial pit was found to be <15secs/mm. Any time of greater than 100secs/mm is deemed 'unsuitable' for a simple soakaway arrangement by Section 3.9.2 of the Technical Handbook. The test results would indicate that this is not a constraint at this site. However, the Vp of <15 secs/mm is deemed by SEPA to be too rapid and requires that the level of sewage treatment be in accordance with the guidance contained within SEPA's policy/ regulatory method RM-04 Regulation of Indirect Sewage Discharges to Groundwater. This dictates that secondary treatment is required where a Vp of <15 secs/mm is determined by the ground investigations.

3.4.5 Where the Vp is <15 secs/mm SEPA also requires the soakaway area in square metres to be calculated by the formula 3.6 x population equivalent (PE). For the proposed development, based on 25 people using the church daily (Total PE of 5) this results in a soakaway area of 18m^2, see Appendix B. This method of calculating the soakaway area overrides the traditional sizing of the Technical Handbook as outlined in BS6297:2007. It is anticipated the soakaway would be located at or about NGR NM 86077 43524.

4. Foul Drainage

4.1 Recommendation

4.1.1 Arthian's investigations indicated that a favourable means of treating the sewage that would be generated by the proposed development would be one based upon biological treatment capable of producing an effluent quality of 20mg/l BOD and 5mg/l Ammonia, both as a mean. The resultant effluent would, in order to be compliant with SEPA requirements, be dispersed into the surrounding subsoil via a constructed soakaway arrangement of at least $18m^2$.

4.1.2 The minimum base area can be provided within a soakaway with dimensions of 6m x 3m x a minimum 0.45 below the invert of the inlet. Alternative sizing may be used however the minimum base area if $18m^2$ must be maintained. The foul soakaway layout is shown in Appendix C.

4.1.3 Arthian recommends that consideration is given to installing a dosed/batch pumping system to ensure that the entire area of the soakaway is utilised.

4.1.4 Under the terms of the Water Environment (Controlled Activities) (Scotland) Regulations 2011, the activity of discharging sewage effluent must be authorised by SEPA and, in view of the population equivalent generated by the dwelling being assessed as 50 or less, a Registration must be obtained before making a discharge from the development.

4.2 Minimum System Requirements – Biological Treatment Plant

4.2.1 The size of the biological treatment plant required to treat the sewage that would be generated by the proposed development was calculated according to recognised industry figures as shown in Table 1 below.

Table 1: Effluent Flows and Loads Figures

Development	Maximum Occupancy	Daily Flow (Litres/person)	BOD loading per person (g/day)	Treatment Capability Required (Kg BOD/day)
Parish Church Toilet (WC) (per use)	25	10	12	0.3

4.2.2 Based on the above information a biological treatment plant capable of treating at least 0.3 kg BOD/day will be required for the development. Consideration should be given to installing a treatment plant of a larger capacity to allow for potential future expansion of the development.

4.3 Composting Toilets

4.3.1 In the event there is insufficient space to install a biological treatment, composting toilets may be a feasible option. In accordance with *SEPA's Regulatory Method (WAT-RM-04), section 3.9 and 3.10* (see below), the liquid fraction from Urine Diverting Dry Toilets (UDDTs) and grey water should be

preferentially discharged to ground via a soakaway, provided the ground conditions have been proven to be sufficiently permeable to support the use of infiltration.

3.9 Composting Toilets

Composting toilets are sometimes an option for small scale situations remote from the public sewer, particularly where there is no water supply.

Composting toilets which divert urine from the solid fraction of the toilet waste are sometimes known as Urine Diverting Dry Toilets (UDDTs).

The urine can be discharged to soakaway with a Registration or Licence according to the population served as calculated as usual using the Flows and Loads document. A percolation test should be undertaken to determine the suitability of soil for infiltration. For registration level discharges the liquid fraction from a UDDT can be discharged via a small soakaway. The soakaway size can be small due to the much reduced volumes from a non-flushing toilet.

Alternatively for households the urine fraction can be used as a fertiliser.

Composting toilets with no urine separation (which can be problematic in the UK climate) keep the liquid fraction within the waste matter. There is no need for a discharge authorisation as there is no discharge.

Properly composted solid fractions from private households can be considered to be fertiliser and applied in accordance with GBR18. SEPA does not seek to regulate the disposal of the solid fraction (or the waste from true composting toilets) from private households provided it is not for commercial gain. Advice on the disposal of the solid fraction/waste from establishments other than private households can be obtained from SEPA National Waste Policy.

3.10 Grey Water

Grey water is all wastewater excluding discharges from toilets i.e. grey water should not have significant faecal contamination. Sources of grey water include sinks, baths, showers and washing machines. Grey water must not be allowed to discharge directly to the water environment but should be directed to a soakaway with an appropriate CAR authorisation. The design of the soakaway should be compliant with the Technical Handbook: (Section 3: Environment), which specifically refers to grey water. This will require an authorisation from local authority Building Control. A filter may help prevent clogging of the soakaway.

4.3.2 The percolation test results confirmed the ground conditions as being conducive to the use of a soakaway for the dispersal of wastewater from the UDDTs and greywater from the proposed development.

4.3.3 The resultant effluent would, in order to compliant with SEPA requirements, be dispersed into the surrounding subsoil via a constructed soakaway arrangement of at least 18m^2. It is anticipated the soakaway would be located at or about NGR NM 86077 43524.

4.3.4 Under the terms of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), the activity of discharging wastewater to land must be authorised by SEPA and a Registration obtained.

Appendices

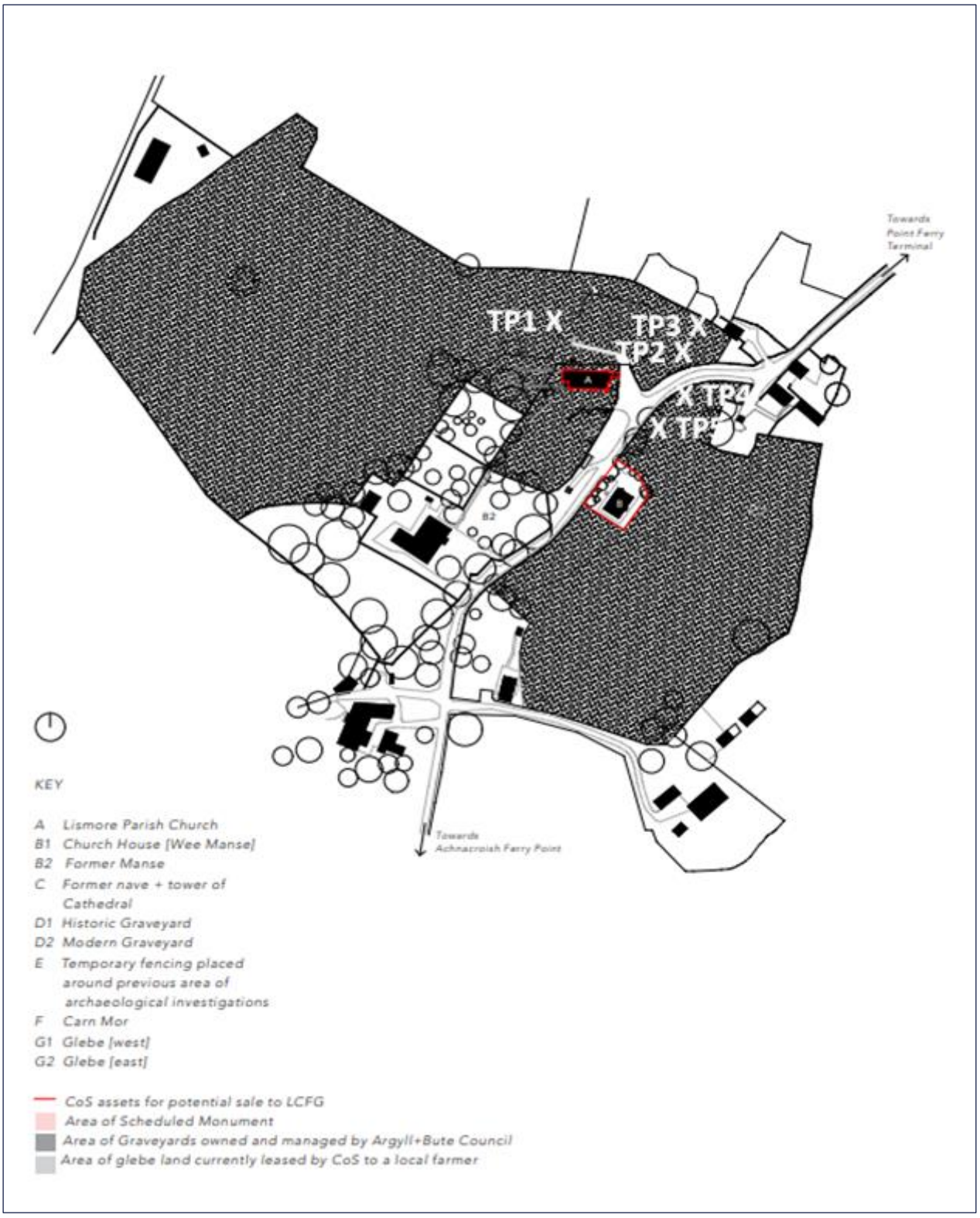
Appendix A

Limitations

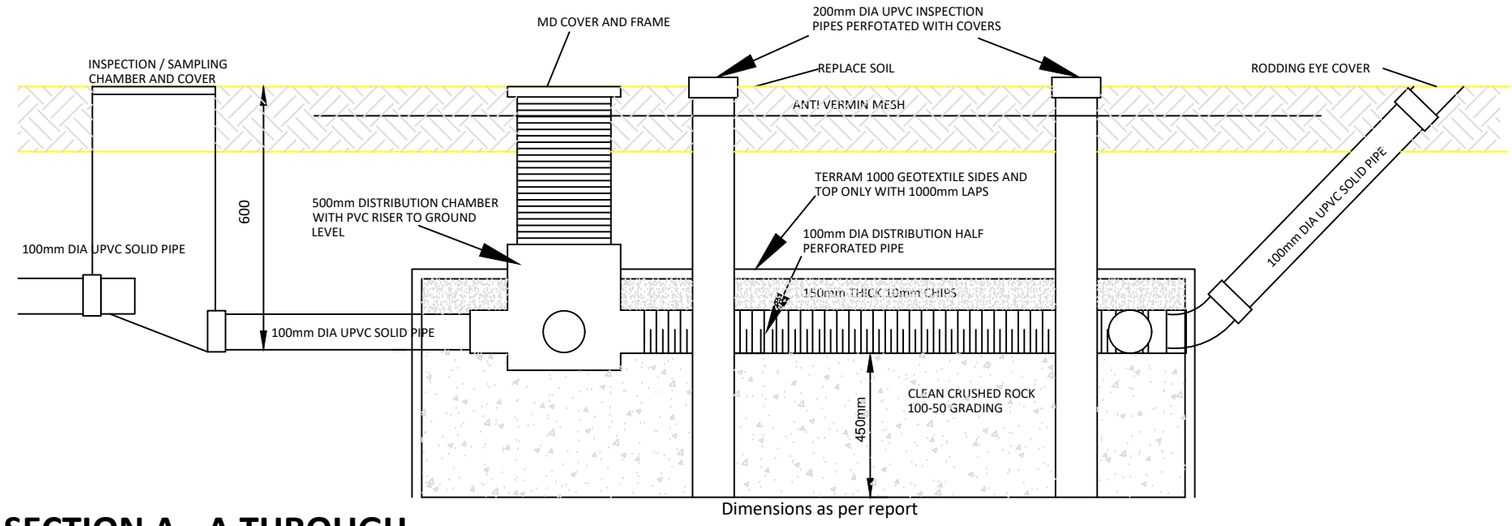
This report contains recommendations from Arthian, which are based on the information listed in the report and reflect the professional opinions of an experienced Environmental Consultant. Arthian obtained, reviewed, and evaluated information from the Client and others to prepare this report. The conclusions, opinions, and recommendations presented in this report are based on this information. However, Arthian does not guarantee the accuracy of the information provided and will not be held responsible for any opinions or conclusions reached based on information that is later proven to be inaccurate.

This report was prepared exclusively for the Client and for the specific purpose for which Arthian was instructed. It is not intended for use by anyone other than the Client without Arthian's written consent. Any unauthorised use of this report is at the sole risk of the user. Anyone using or relying on this report, other than the Client, agrees to indemnify and hold harmless Arthian from any claims, losses, or damages arising from the performance of the work by the Consultant.

Appendix B

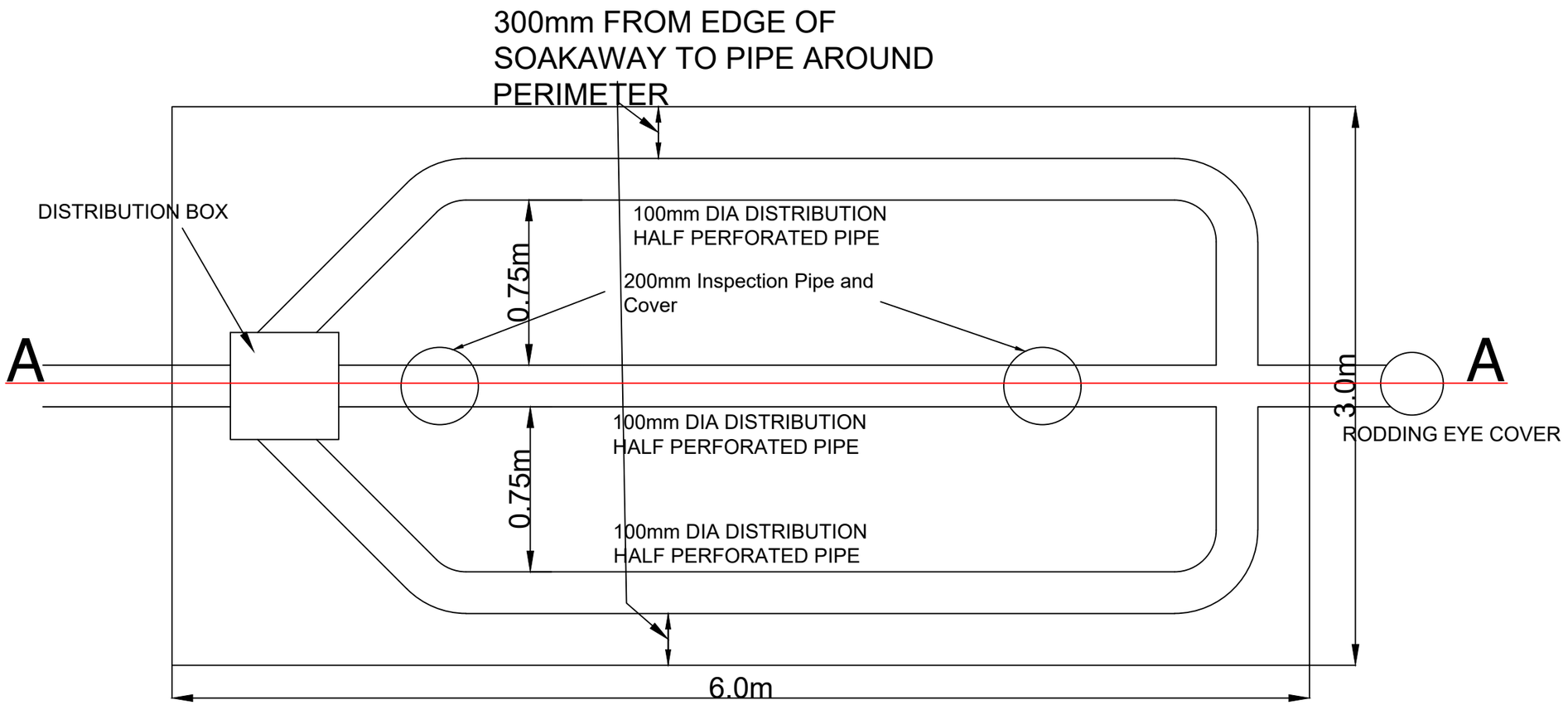

TP1 X
TP3 X
TP2 X
X TP4
X TP5
Towards Point Ferry Terminal
Towards Achnacroish Ferry Point
KEY
A Lismore Parish Church
B1 Church House [Wee Manse]
B2 Former Manse
C Former nave + tower of Cathedral
D1 Historic Graveyard
D2 Modern Graveyard
E Temporary fencing placed around previous area of archaeological investigations
F Carn Mor
G1 Glebe [west]
G2 Glebe [east]
CoS assets for potential sale to LCFG
Area of Scheduled Monument
Area of Graveyards owned and managed by Argyll+Bute Council
Area of glebe land currently leased by CoS to a local farmer

Appendix C



Dimensions as per report

SECTION A - A THROUGH FOUL WATER SOAKAWAY (NTS)



PLAN VIEW SOAKAWAY ARRANGEMENTS (NTS)

Legend:

-	-	-	-	-
-	-	-	-	-
Final Revision:	Date:	Description:	By:	Chk:

All Dimensions to be checked on site and not scaled from this drawing.
This drawing is not for construction
This drawing is for planning only
All services to be checked on site and not scaled from this drawing

Arthian See a Difference

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Issue

Client: **Kilmoluag Liosmor**

Site: **Lismore Church, Lismore, PA34 5UL**

Drawing Title: **Soakaway Details**

Date:	Scale:	Paper Size:
29.01.25	NTS	A3 (297 x 420mm)

Drawn By:	Checked By:	Status:	Final Revision:
DC	GM	Issue	1.0

CAD Ref:	Drawing No: / Client Ref:
A3 Landscape	**Appendix C**

Appendix D

Photos 1 & 2 – Site location

Photo 3 – Trial pit 1 location

Photo 4 – Silt, gravel deposits

Photo 5 – Percolation test