

# S.A. MCGREGOR



## GROUND ASSESSMENT & DRAINAGE RECOMMENDATION REPORT

PROPOSED NEW FARMHOUSE & GARAGE  
COULNACRAIG FARM  
POTARCH  
BANCHORY  
ABERDEENSHIRE  
AB31 4BJ

<i>Client:</i>	Mr and Mrs Merchant
<i>Architects:</i>	Matthew W. Merchant Chartered Architects
<i>Contract No.</i>	3596/24
<i>Report Issued:</i>	16 March 2024

## CONTENTS

### Introduction

### Site Location & Brief Description

### Site Work

#### *Trial Pits*

#### *Percolation Testing and Infiltration Testing*

### Ground Assessment

#### *Published Geology*

#### *Encountered Ground Conditions*

#### *Groundwater Observations*

#### *Note*

### Discussion

#### *Sub-Soils*

#### *Sewage Treatment*

#### *Foul Water Discharge*

#### *SuDS & Surface Waters*

### Drainage Recommendations

#### *Foul Water Discharge*

#### *SEPA*

#### *Surface Water Disposal*

#### *Proposed Drainage*

#### *System Maintenance*

#### *Sewage Treatment System*

#### *Soakaways/Filter Drains*

### Regulations

### Foundation Recommendations

#### *Safe Bearing Capacity*

#### *Settlement*

#### *Excavations*

#### *De-watering*

## APPENDIX A

Site Plans	Fig. 1. General & Site Location Plans Fig. 2. Trial Pit Location Plan
Trial Pit Logs	TP1, TP2 & TP5
Drainage	Fig. 3. Proposed Drainage Layout Fig. 4. Indicative Partial Soakaway Installation Fig. 5. Indicative Filter Drain Installation
Certificates	Foul Water Discharge Surface Water Disposal

GROUND ASSESSMENT  
&  
DRAINAGE RECOMMENDATION REPORT  
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## INTRODUCTION

At the request of Mr and Mrs Merchant, this report is presented for the new planning application for the proposed new dwellinghouse, garage and annexe on land at Coulnacraig Farm, Potarch, Banchory, Aberdeenshire.

The purpose of the visit was to carry out a site assessment to determine the nature of the materials underlying the area of the site and to undertake the following: -

- to carry out percolation testing to assess the suitability of the underground strata for the disposal of effluent from a sewage treatment system to the ground via a designed sub-surface soakaway system

- to carry infiltration testing for the disposal design for surface waters from the proposed development

## SITE LOCATION & BRIEF DESCRIPTION

The site is located on land at Coulnacraig Farm, Potarch, west of Banchory with access from the A93 and local roads, OS NGR NO 62193 95323, see Fig.1. General Location Plan.

The site is currently un-serviced; however, electricity, water and telephone are nearby. There is no mains drainage; all nearby properties are served by private sewage treatment systems.

The nearest water course is the Burn of Greenoch to the west of the site which flows into the River Dee at NGR 362085, 796005.

## SITE WORK

### *Trial Pits*

The original ground investigation was undertaken in March 2016.

A tracked excavator with a 0.60m bucket excavated trial pits (TP1, TP2 and TP5) to carry out an assessment of the underlying ground conditions, to carry out percolation and infiltration testing in the areas of the potential sub-surface soakaways.

The locations of the trial pits were decided on site and are indicated on Fig. 2. Trial Pit Location Plan in Appendix A.

### *Percolation Testing and Infiltration Testing*

Percolation and Infiltration testing were not carried out due the very clayey nature of the soils and water ingress from around 1.20mbegl.

## GROUND ASSESSMENT

### *Published Geology*

The British Geological Survey 1:50,000 Quaternary and Solid maps indicate that the site is overlain by Banchory Till Formation (Diamicton - sand, gravel, silt and clay) sedimentary superficial deposits formed between 116 and 11.8 thousand years ago during the Quaternary period.

The site is underlain by the Queen's Hill Formation (Psammite) metamorphic bedrock formed between 1000 and 541 million years ago between the Tonian and Ediacaran Periods.

### *Encountered Ground Conditions*

The proposed area of the new sewage treatment system and soakaways are overlain by overgrown, rough vegetation and overlying grey clays.

### *Ground Water Observations*

Ground water ingress is recorded at around 1.20m.

## DISCUSSION

### *Sub-Soils & Ground Water*

The underlying clayey sub-soils are not considered suitable for the construction of 'standard' sub-surface soakaway systems for the disposal of the foul and surface waters from the proposed development.

### *Sewage Treatment & Foul Water Discharge*

Connection to the mains sewer is not available for this development. It is proposed to install private sewage treatment plant to serve the proposed new dwellinghouse.

The underlying strata are not considered suitable for the construction of a 'standard' sub-surface soakaway systems for the disposal of foul waters from a package Sewage Treatment Plant (PSTP).

It is proposed to connect to the existing drain to discharge to the watercourse. The level of treatment required for the sewage discharge to a watercourse is determined using the table from WAT-RM-03, Dec 2014, see below: -

**Table 1 Registration look up table for sewage discharges to watercourses**

Dilution range:		Treatment / standards required
Anticipated/Existing Pollution Pressure	No Anticipated/Existing Pollution Pressure	
>400:1	>400:1	Primary / Septic tank (with partial soakaway)
100:1 - 400:1	30:1 - 400:1	Secondary treatment designed to produce effluent with a mean BOD concentration $\leq 20\text{mg/l}$
30:1 - 100:1	10:1 - 30:1	Secondary: designed to produce effluent with a mean ammonia concentration $\leq 5\text{mg/l}$
<30:1	<10:1	Enhanced treatment or refuse

It is considered that the receiving water, the burn of Greenoch Burn, has a dilution range of 10:1 – 30:1 and therefore secondary treatment is required, however, this may require verification by SEPA.

### *SuDS & Surface Water Disposal*

The disposal of surface waters from the dwellinghouse needs to be assessed in terms of both the quantity and the quality of the discharge for Building Regulations and SEPA. Using the SIA tool, the land use run-off quality has been determined as 'Very Low', see summary table: -

Land Use Type	Residential Roofing (& permeable gravel hardstanding)
Pollution Hazard Level	Very Low
Pollution Hazard Indices	
TSS	0.2
Metals	0.2
Hydrocarbons	0.05
Surface Water Protection (SuDS) 1 Component	Filter Drain (discharge to waterbody)
SuDS Pollution Mitigation Indices	
TSS	0.4
Metals	0.4
Hydrocarbons	0.4
Groundwater Protection Type	No discharge to ground
Combined Pollution Mitigation Indices	
TSS	0.4
Metals	0.4
Hydrocarbons	0.4
Acceptability of Pollution Mitigation	
TSS	Sufficient
Metals	Sufficient
Hydrocarbons	Sufficient

The SIA assessment confirms that the installation of a filter drain provides sufficient quality mitigation for the surface water run-off from the roof areas and permeable driveways/parking areas for the proposed development prior to disposal to the ground.

The design is to be effective in all-weather conditions and are not considered to pose a risk to local water supplies and the water environment.

### DRAINAGE RECOMMENDATIONS

#### *Sewage Treatment & Foul Water Discharge*

To comply with the Domestic Technical Handbook (para. 3.9.2) which sets out guidance on how proposals may meet the Building Standards set out in the Building (Scotland) Regulations 2004, a discharge system must be designed and constructed in accordance with the requirements of SEPA and WAT-RM-03, Sewage Discharges to Surface Waters.

In line with the SEPA guidance it is required to install a partial soakaway after the PSTP and prior to the discharge to the watercourse.

The size of the partial soakaway is determined is derived from  $A = 3.6 \times PE$ , see the following table: -

Proposed Development	Population Equivalent, PE (as defined in BW COP:18.11/14)	Min. Base Area (m <sup>2</sup> ) PSTP Only
New Dwellinghouse, Annex & Garage, including existing workshop	Up to 20	72m <sup>2</sup>

#### SEPA

The following table indicates the required treatment standard for the discharge from the treatment systems prior to discharge to the watercourse: -

	BOD (mg/l)	SS (mg/l)	NH4-N (mg/l)
Treatment / Standard Required by SEPA	20	30	5

It is recommended to install a package sewage treatment plant (PSTP) tested and certified to EN12566 Part 3. It is recommended that for up to a 20PE a package sewage treatment plant (PSTP) with a minimum capacity of 8,000-litres is installed.

Full details of the proposed treatment system will be made available to the Building Standards Officer and SEPA once it has been determined after consultation which system is the most suitable for the proposed development and meets the requirements of SEPA to enable the discharge to the watercourse to be licensed/registered under CAR.

The above designed system has planning approval.

#### Surface Water Disposal

The quantity of the discharge must also be controlled to ensure that the proposed development does not increase the pre-development flow of the watercourse.

The size of the proposed filter drain prior to discharge to the watercourse is based on the impermeable surface area of the development i.e. the roof area of the new house, see table below: -

Impermeable Area (m <sup>2</sup> )	Filter Drain Width x Length (m)	Discharge
New Dwellinghouse, Garage & Annex Roof Areas Up to 300m <sup>2</sup>	0.5m x 24m With 0.50m depth filter stone	150mm diameter combined drain with a 110mm dia. drain into watercourse fitted with a storm brake

These dimensions include for a 1 in 200-year storm event and SEPA +Climate Change Peak Rainfall Intensity Allowance of +37% for the North East Region of Scotland and in accordance with BRE Digest 365.

### *Proposed Drainage*

The proposed drainage layout is shown on Fig. 3. with indicative partial soakaway and filter drain installations shown on Figs. 4 and 5 with discharge certificates all in Appendix A.

## SYSTEM MAINTENANCE

### *Sewage Treatment System*

All servicing and maintenance should be undertaken in full accordance with the manufacturer's literature or by a responsible qualified person. The PSTP should be regularly inspected and 'desludged' (emptied) when appropriate to ensure solids and silts do not 'clog' the soakaway or make their way to the discharge outlet.

### *Soakaways/Filter Drains*

The soakaways are designed for the lifetime of the proposed development if they are not allowed to silt up nor the pipework to be blocked.

During the development of the site, and the excavation of the soakaways, should any field drains be found within 10m of the soakaway they should be realigned or relocated accordingly.

All the drainage and associated soakaways will remain private, to be maintained by the new property owners in general accordance with maintenance activities as listed in the following table:

<b>Operation &amp; Maintenance for Soakaway</b>		
Monitoring	Inspect all associated silt traps and inspection chambers and note rate of sediment accumulation	Monthly within the first year after installation, 6 monthly thereafter unless accumulation rate indicated more frequent emptying
	Check soakaway to ensure emptying is occurring, especially after prolonged rainfall events	6 monthly
Regular Maintenance	Carry out inspection for sediment and debris in the inspection chamber, rodding eyes, and any directional change chambers	6 monthly
	Clean out all gutters and downpipes (leaves, pine needles etc.) and any filters present	Annually, especially in the autumn after leaf fall (or as required)
	Ensure no root migration encroaches soakaway and trim back when required	Annually (or as required)
Remedial Actions	If performance deteriorates or soakaway fails reconstruct the soakaway and/or replace stone fill	As required
	When necessary, replace clogged geotextile	As required

## REGULATIONS

SEPA and Building Regulations require that infiltration systems (soakaways) are located at least:

- 50m from any spring, well or borehole used as drinking water supply
- 10m horizontally from any water course (including any inland or coastal waters), permeable drain (including culvert), road or railway
- 5m from all buildings
- 5m from boundaries (*reduced distance to boundaries may also be subject to agreement from adjacent land owners where the soakaway is considered not to be detrimental to the adjacent property*)

## APPENDIX A

Site Plans	Fig. 1. General & Site Location Plans Fig. 2. Trial Pit Location Plan
Drainage	Fig. 3. Proposed Drainage Layout Fig. 4. Indicative Partial Soakaway Installation Fig. 5. Indicative Filter Drain Installation
Certificates	Foul Water Discharge Surface Water Disposal



Fig. 1. GENERAL & SITE LOCATION PLANS

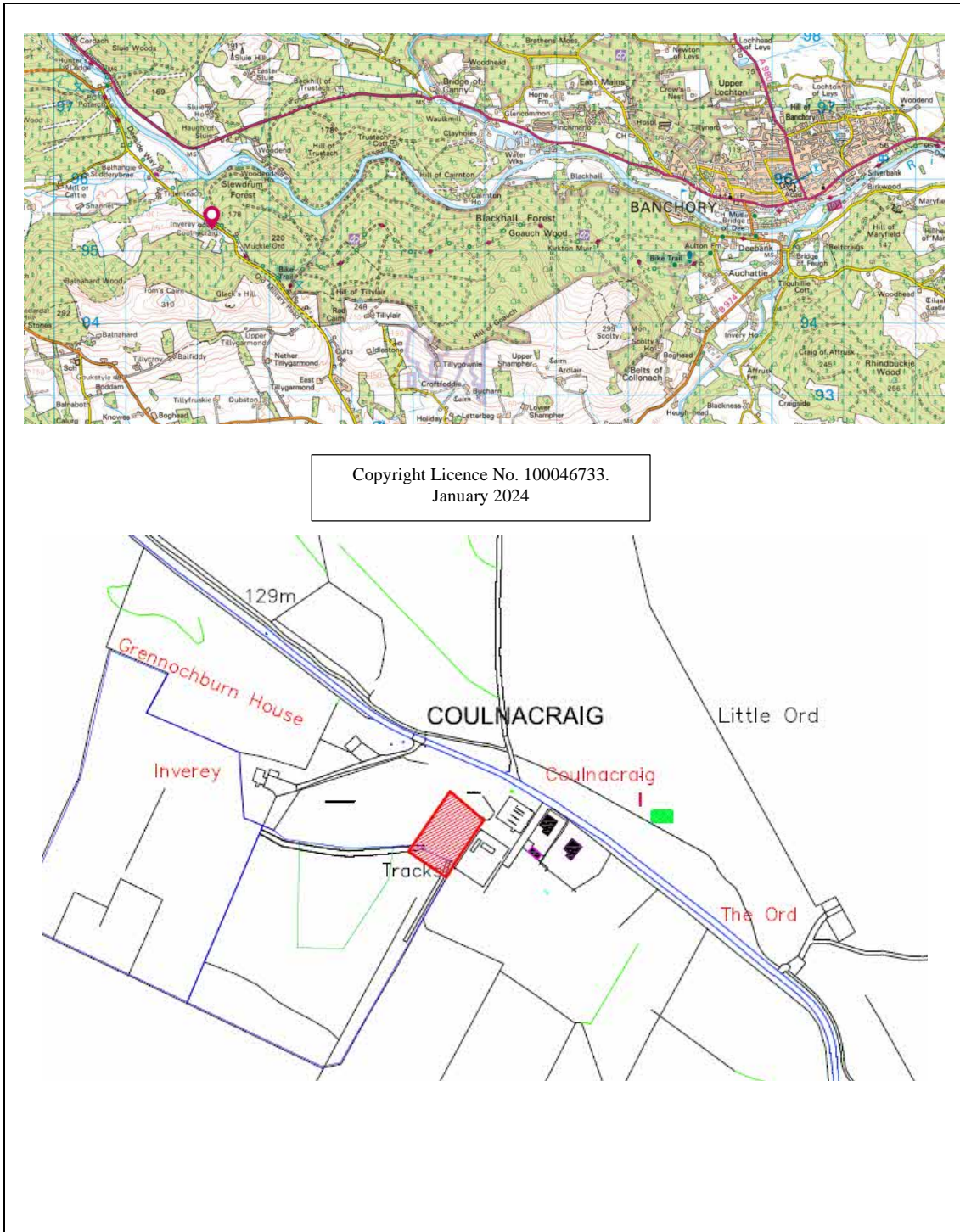


Fig. 2. TRIAL PIT LOCATION PLAN

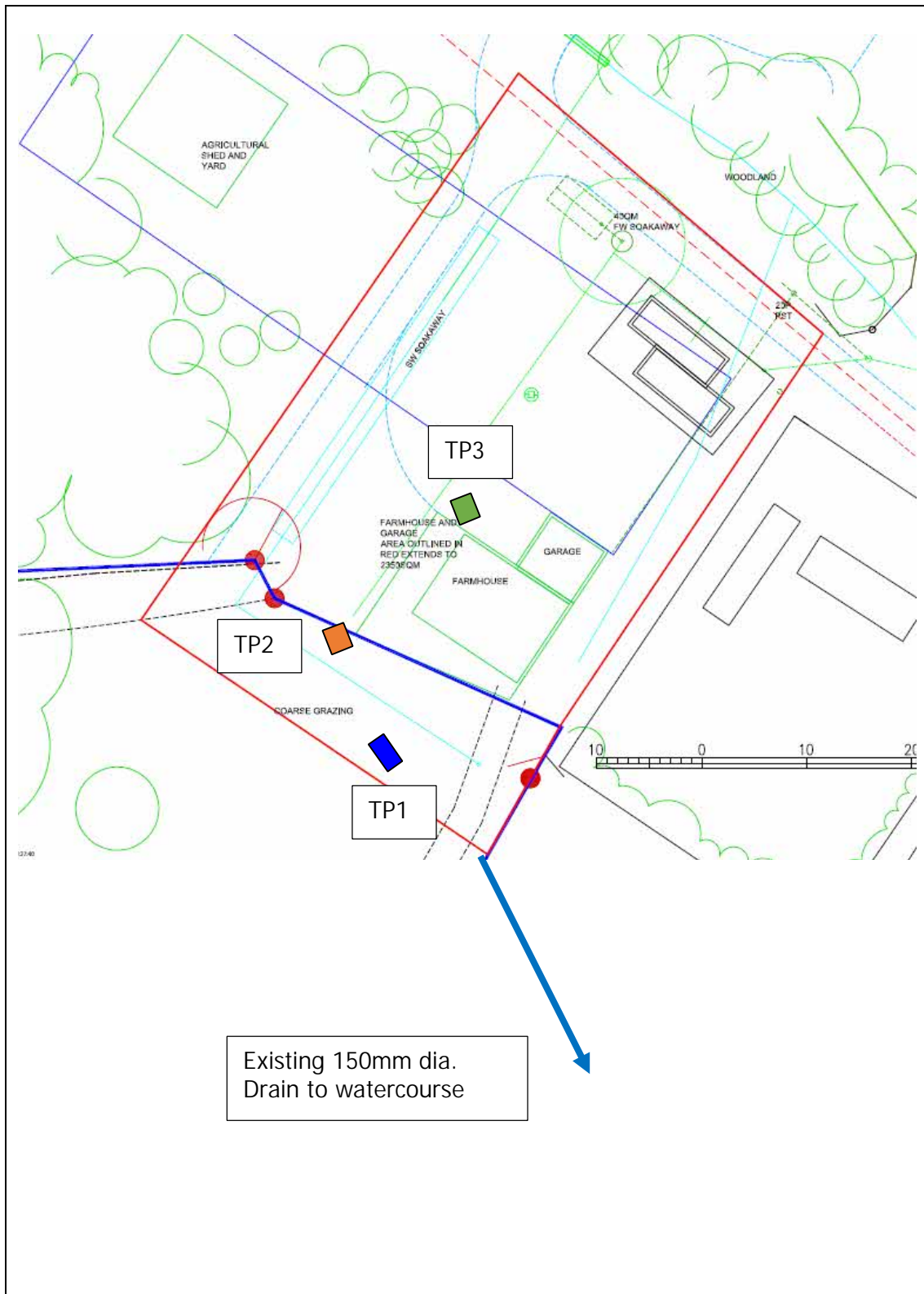


Fig. 3. PROPOSED DRAINAGE LAYOUT

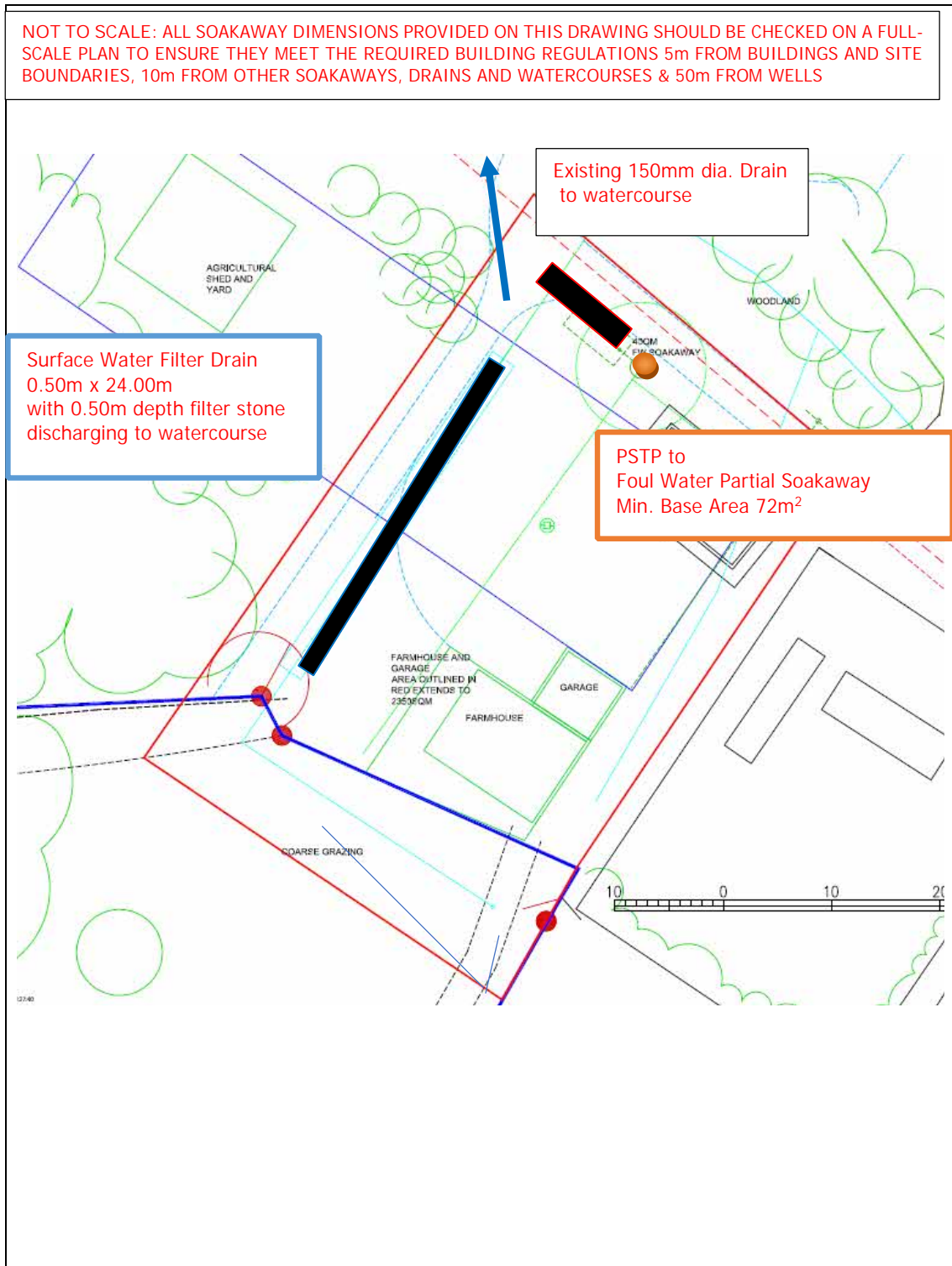


Fig. 4. INDICATIVE PARTIAL SOAKAWAY INSTALLATION  
(sketch only, not to scale)

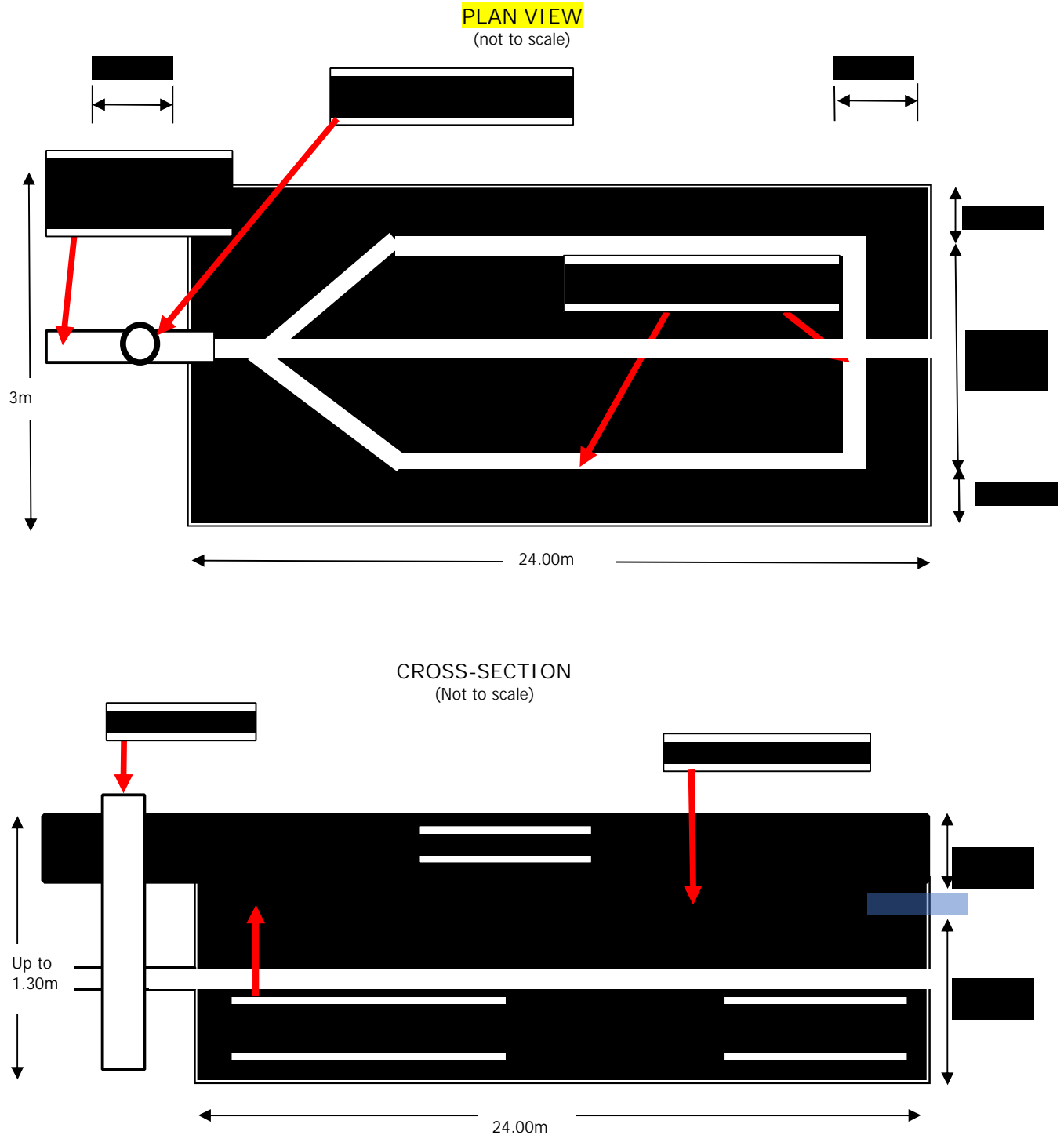
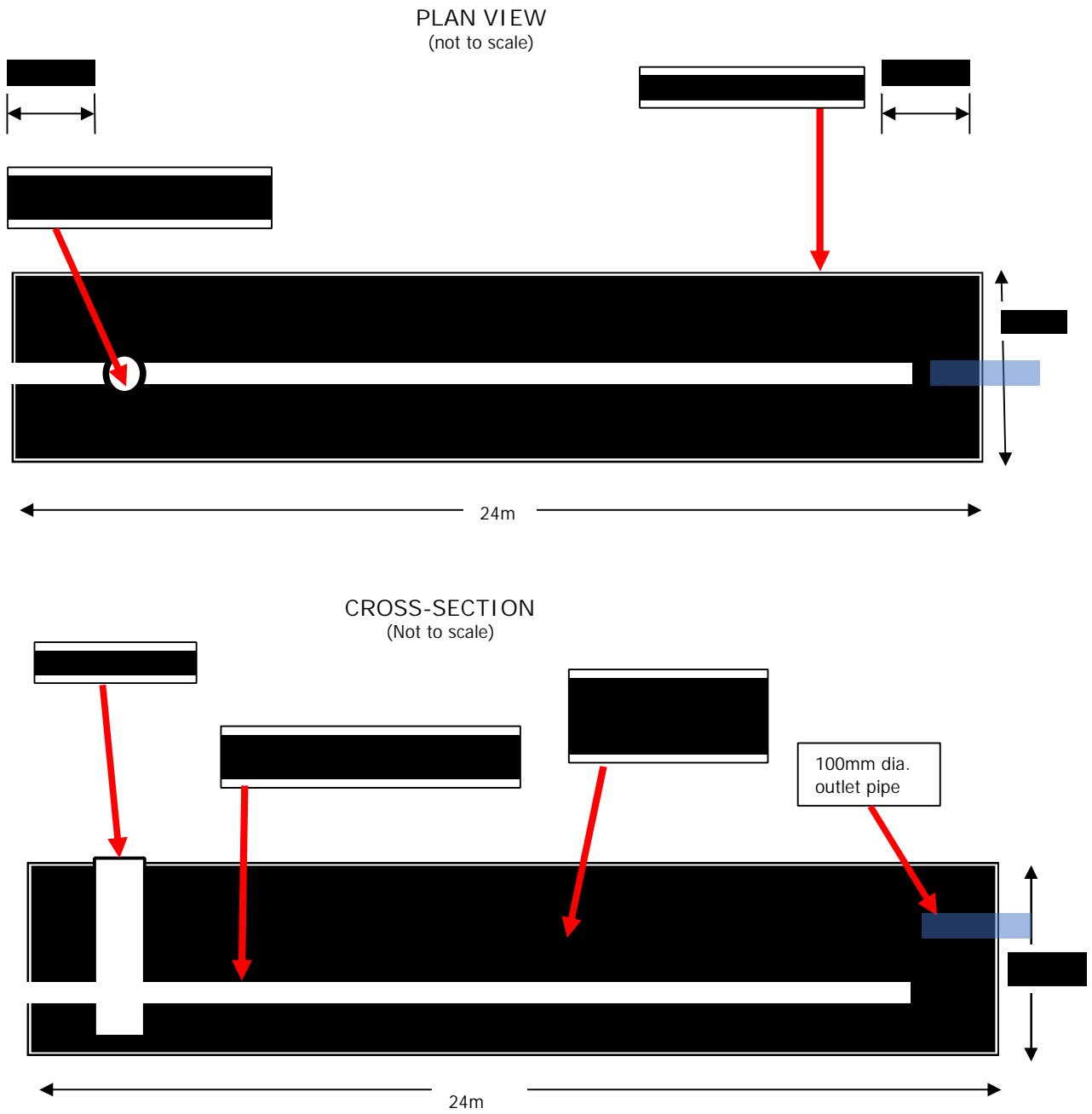

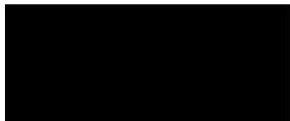


Fig. 5. INDICATIVE FILTER DRAIN INSTALLATION

(sketch only, not to scale)



<b>CERTIFICATE FOR PROPOSED FOUL WATER DISCHARGE</b>		
<b>Applicants Name</b>	Mr & Mrs Merchant	
<b>Architect</b>	MWM Chartered Architects	
<b>Site Address</b>	Coulnacraig Farm, Potarch, Banchory, Aberdeenshire, AB31 4BJ	
<b>Date of Assessment</b>	March 2016 & March 2024	
<b>Weather Conditions</b>	Light rain	
<b>Encountered Ground Conditions</b>		
The proposed area of the new sewage treatment system and soakaways are overlain by overgrown, rough vegetation and overlying grey clays.		
<b>Groundwater Observations:</b> Groundwater was encountered during the investigation from 1.20mbe gl		
<b>Wells / Boreholes:</b> No known potable water supply wells/boreholes within 50m of the proposed infiltration fields		
<b>Percolation Testing</b>	Not undertaken due to clay soils and groundwater ingress	
Average time taken	n/a	seconds
Soil Percolation Value, Vp	<b>&gt;120</b>	s/mm
<b>Discharge Design</b>		
Proposed Development	New Dwellinghouse, Annex & Garage and Existing Workshop	
Population Equivalent, PE	<b>Up to 20</b>	
Sewage Treatment Type	PSTP	Minimum 8,000-litre Capacity
Minimum Base Area	<b>72 m<sup>2</sup></b>	Partial Soakaway
I hereby certify that I have carried out the above assessment in accordance with procedures specified within the Domestic Scottish Building Standards Technical Handbook (Environmental Standard 3.9 Infiltration Systems) and SEPA A WAT-RM-04, the results of which are tabulated above, and that the proposed drainage scheme detailed on the attached plans and report has been designed considering the recommendations in the standards and regulatory standards.		
<b>Signed</b>		<b>Date</b> 16 March 2024
<b>Name / Company</b>	S. A. McGregor	
<b>Address</b>	Serenje, Kingsford Steadings, Alford, Aberdeenshire, AB33 8HN	
<b>Qualification</b>	B.Eng (Civil Engineering)	

<b>CERTIFICATE FOR PROPOSED SURFACE WATER DISPOSAL</b>			
<b>Applicants Name</b>	Mr & Mrs Merchant		
<b>Architect</b>	MWM Chartered Architects		
<b>Site Address</b>	Coulnacraig Farm, Potarch, Banchory, Aberdeenshire, AB31 4BJ		
<b>Date of Assessment</b>	March 2016 & March 2024		
<b>Weather Conditions</b>	Light rain		
<b>Encountered Ground Conditions</b>			
The proposed area of the new sewage treatment system and soakaways are overlain by overgrown, rough vegetation and overlying grey clays.			
<b>Groundwater Observations:</b> Groundwater was encountered during the investigation from 1.20mbegl			
<b>Wells / Boreholes:</b> No known potable water supply wells/boreholes within 50m of the proposed infiltration fields			
<b>Infiltration Testing</b>	Not undertaken due to clay soils and groundwater ingress		
Infiltration Test Zone	n/a	mbegl	
Soil Infiltration Rate, f	<1 x 10 <sup>-7</sup>	m/s	
<b>SuDS Design</b>	Filter Drain		
Proposed Development	New Dwellinghouse, Annex & Garage Roof Areas		
Impermeable Areas	Dwellinghouse Roof Areas	Up to <b>200 m<sup>2</sup></b>	
Design Dimensions, L x W	<b>0.50m</b>	<b>24.00m</b>	<b>0.50m Stone Storage depth</b>
I hereby certify that I have carried out the above tests and calculations in accordance with BRE Digest 365 and in conjunction with the full requirements set out within the Domestic Scottish Building Standards Technical Handbook. The results of which are tabulated above, and that the proposed drainage scheme detailed within this report has been designed considering the recommendations in the standards.			
<b>Signed</b>			<b>Date</b> 16 March 2024
<b>Name / Company</b>	S. A. McGregor		
<b>Address</b>	Serenje, Kingsford Steadings, Alford, Aberdeenshire, AB33 8HN		
<b>Qualification</b>	B.Eng (Civil Engineering)		