

3. SCOPE OF STUDY.

This report details the results of our investigations into the mining stability of the above site. Our report and conclusions has been based on a desk study.

It is intended to construct two new dwelling houses within the site boundaries.

4. DESK STUDY.

The desk study comprised an examination and study of the following maps and publications.

1. Geology for Land Use Planning, Bathgate, British Geological Survey, Sheets NS 97 SW, 1 : 10,000, 1988.
2. The Geological Survey of Great Britain, Stirlingshire, Sheet 35 NE, 1 : 10,560, 1922.
3. The Economic Geology of the Central Coalfield of Scotland, Area 2, H.M.S.O., 1917.
4. Abandonment Plan No 9020, Muiravonside Colliery, No 4 Pit, Upper Drumgray Coal, 1927
5. Abandonment Plan No 2907, Muiravonside Colliery, No 4 Pit, Upper and Lower Drumgray Coals.
6. Coal Authority Interactive Maps.

5. GEOLOGY.

The desk study revealed the site to be underlain by up to 12 metres of boulder clay which rest in turn on rock strata of the Lower Coal Measures.

The strata dip to the north at approximately 1 in 9.

6. FAULTS.

There are no known faults within the site boundaries or influencing distances from them.

7. SHAFTS AND ADITS.

There are no known shafts or adits within the site boundaries, or influencing distances from them.

The nearest known shaft is situated 4 metres to the east of the eastern site boundary. The Coal Authority often adopts a rule of thumb of a 45 degree spread from rockhead to ensure stability around old shafts in the event of a collapse. They adopt this rule for all soil types. However it is worthy of note that where boulder clay is present, in the event of a shaft collapse, the angle of collapse is likely to be just off the vertical. In the case of loose sands the angle could be as low as 32 degrees. It is estimated that the rockhead in the area of the shaft is at a depth of approximately 10 metres.

7. SHAFTS AND ADITS (cont).

Using the Coal Authority rule of thumb would imply a 10 metre no build zone around the old shaft. The old shaft is situated 14 metres to the east of the nearest building line in Plot 2, and using this very conservative rule of thumb (where the superficial deposits consist of boulder clay) it is our professional opinion that the presence of the old shaft will not affect the stability of Plot 1.

8. OPEN-CAST MINING.

No open-cast mining has taken place within 200 metres of the site boundaries. All coals of workable thickness have already been extracted from beneath the site, and hence open-casting is considered highly unlikely in the future.

9. REMEDIAL WORKS.

The Client has indicated that no remedial works have been carried out by the Coal Authority within the site boundaries or influencing distances from them.

10. PAST WORKING.

The desk study has revealed that workings have taken place in the following coals beneath the site, the coals being given in descending order; Lower Drumgray, Mill, Ball and Main. All workings ceased by 1926.

11. GAS EMISSIONS.

The Client has indicated that no known gas emissions have taken place beneath the site. In this connection the site is underlain by between 10 and 12 metres of impermeable boulder clay which will prevent migration of gases to the surface. The probability of gas migrating to the surface is very low. It is our professional opinion that no precautions are necessary in the design of foundations as regards mine gases.

12. PRESENT.

No workings are at present taking place beneath the site.

13. FUTURE.

All workable coals have been removed from beneath the site. It is highly unlikely that any underground working will take place in the future.

14. MINING STABILITY ASPECTS AND FOUNDATION DESIGN.


The Upper Drumgray Coal which is the shallowest workable coal beneath the site is estimated to lie at approximately 12.50 metres at point A, and 19 metres at point B.

Abandonment Plan No 2907 and No 9020, of the Upper Drumgray (the shallowest workable coal beneath the site) shows that the Upper Drumgray was not worked beneath the site. The abandonment plans were prepared in 1927 by a qualified mining surveyor, and consequently they may be considered accurate. It is thus concluded that the site is stable with regard to this coal.

Other coals have been worked beneath the horizon of the Upper Drumgray but are deep enough to require no further consideration.

15. CONCLUSIONS AND RECOMMENDATIONS.

- (1) Mining has taken place beneath the site in several coals the method of working being long wall. The workings are deep enough to ensure that all subsidence will have long since taken place. The site is stable from a mining view point.
- (2) There are no known shafts or adits within the site boundaries, or influencing distances from them.
- (3) No precautions are required in the design of foundations from a mining view point.
- (4) The engineering properties of the superficial deposits will require to be assessed by a trial pit investigation followed by preparation of a foundation report. Foundations are likely to consist of normal reinforced concrete strip footings.

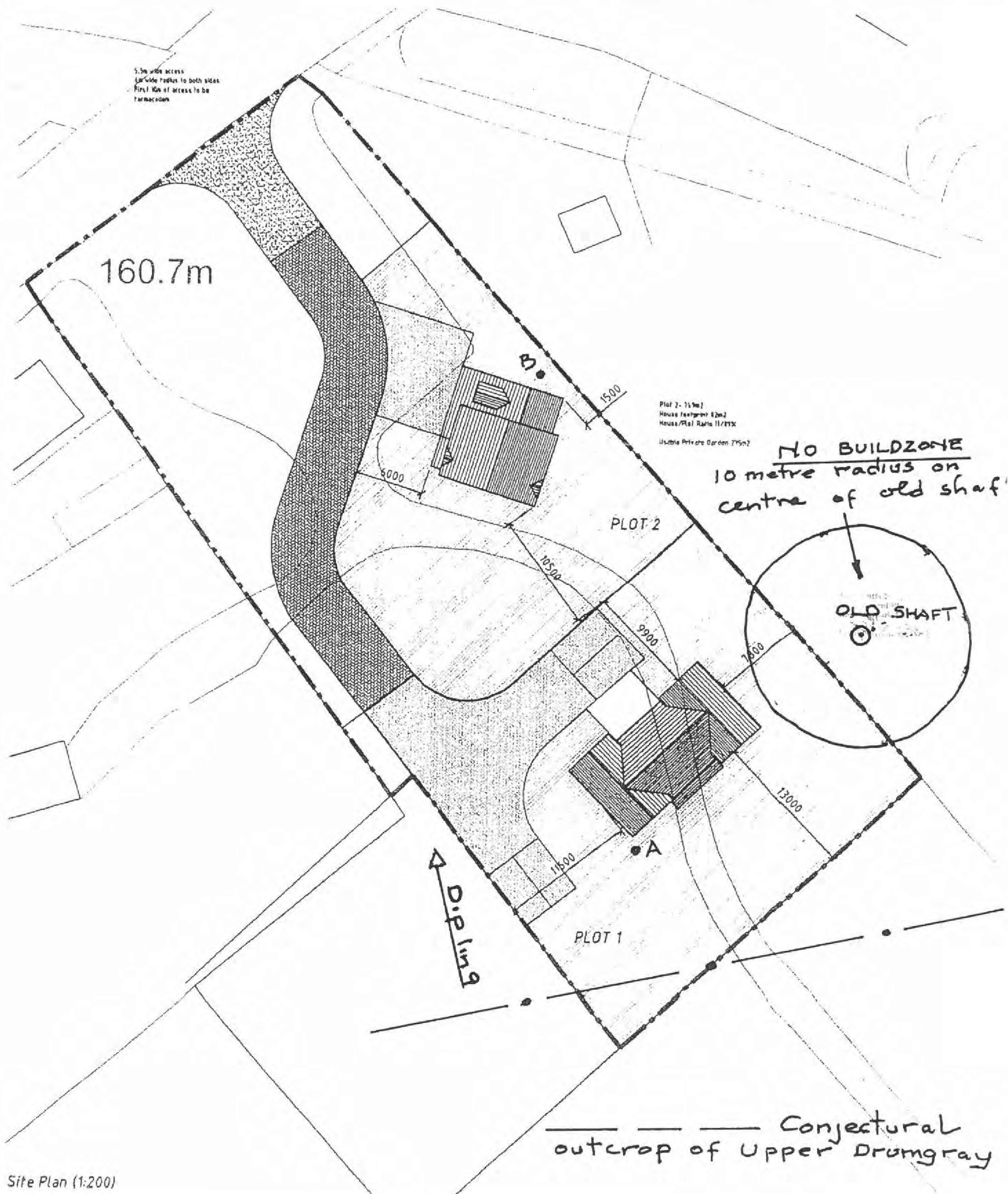


W SIMPSON B.Sc.(Mining), M.Sc., C. Eng., MICE, MIHT, F.G.S.

APPENDIX

APPENDIX 1

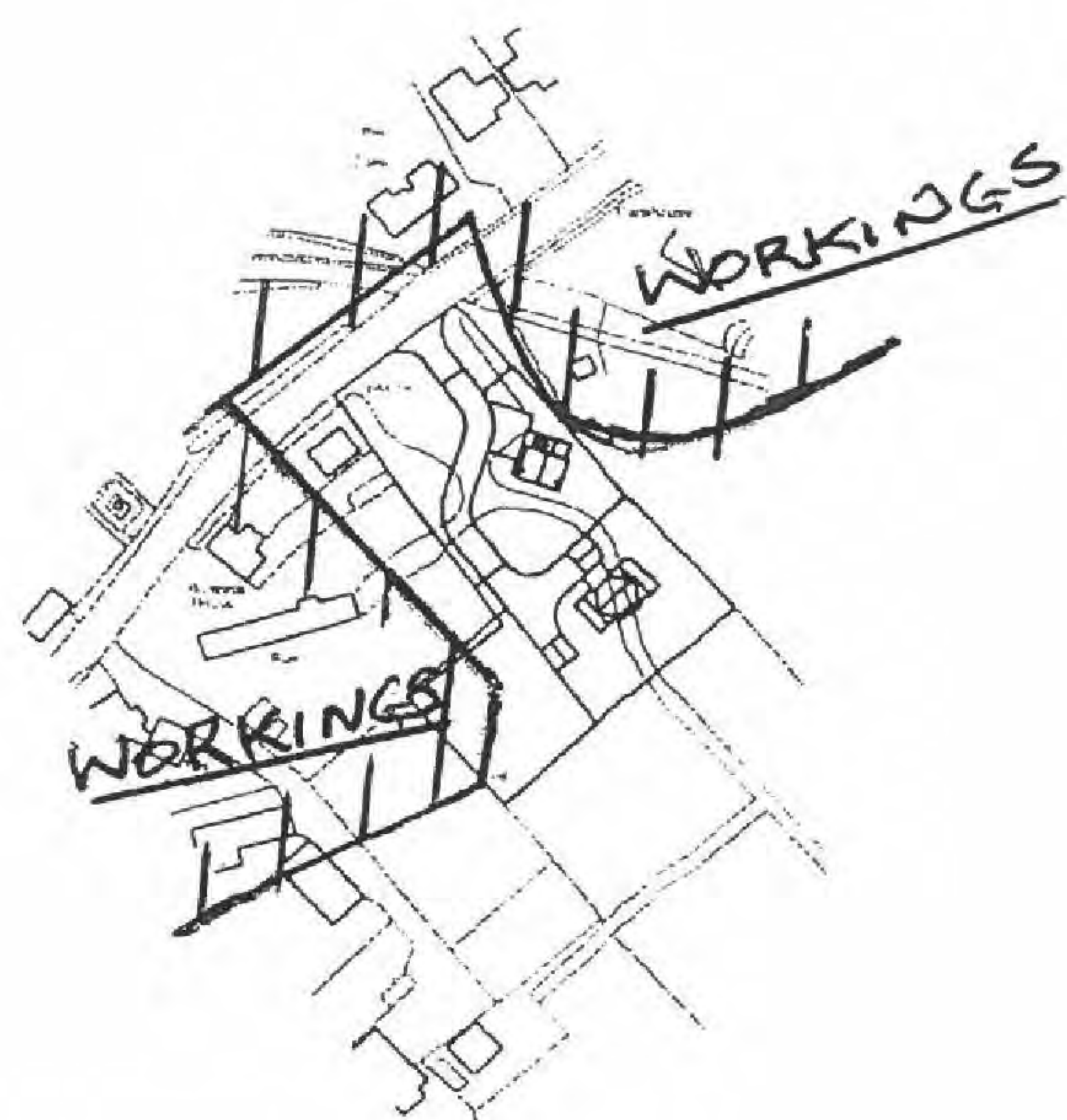
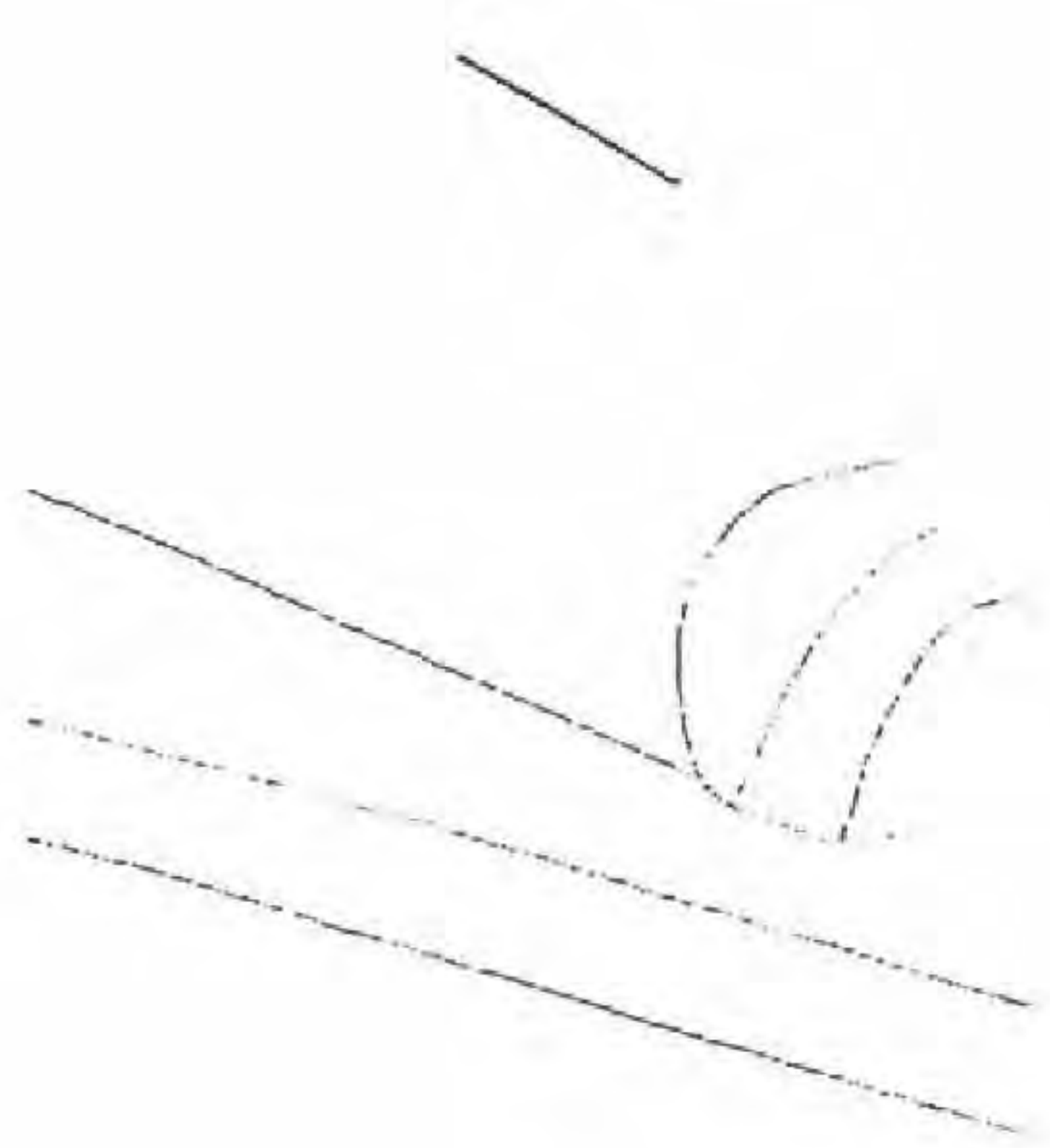
SOLID GEOLOGY OF SITE AREA



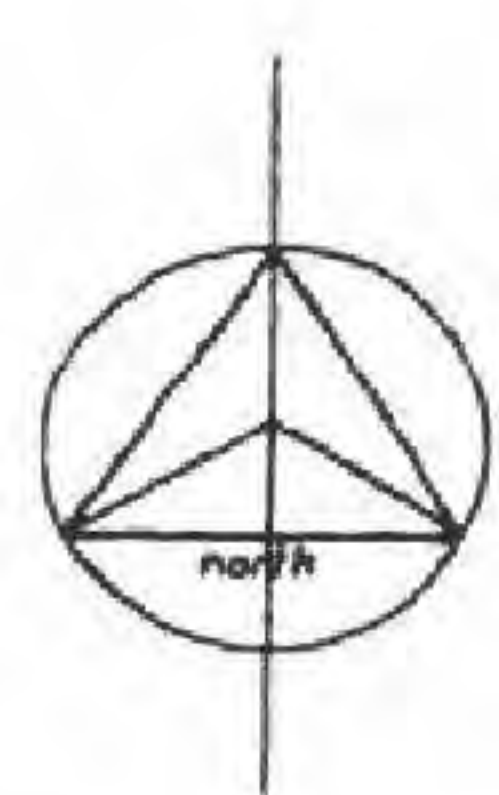
SCALE 1:500

APPENDIX 2

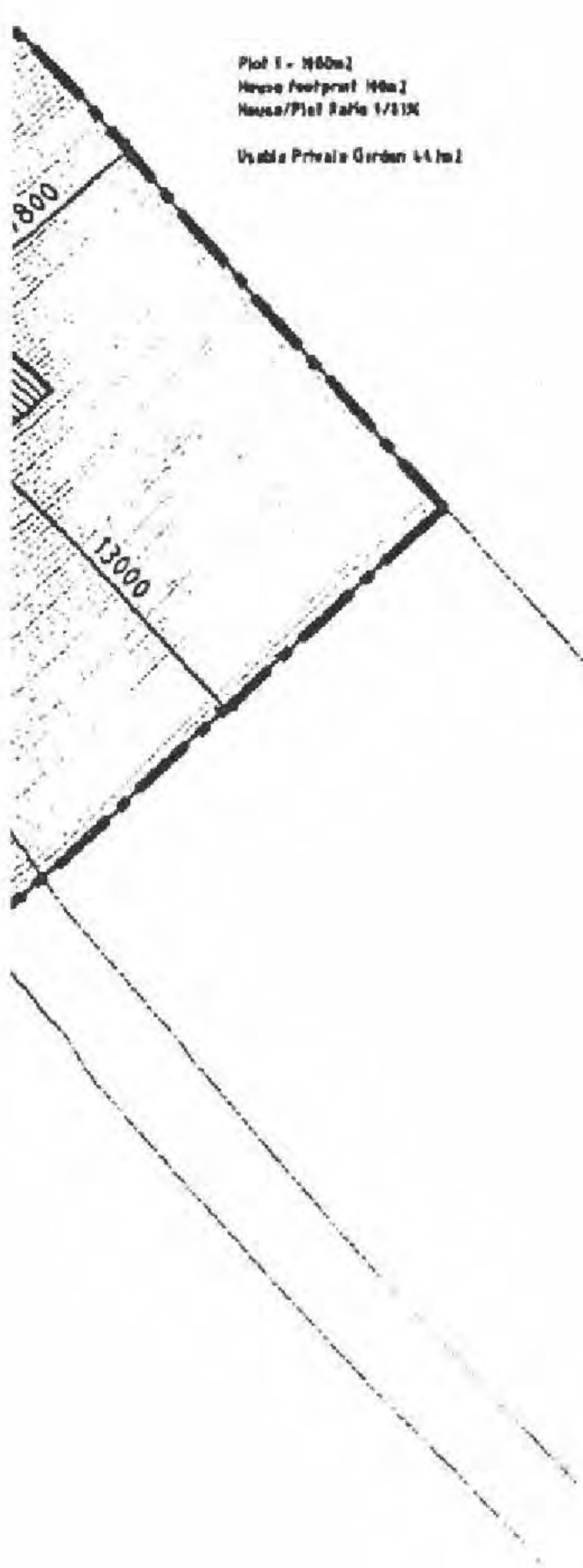
PLAN SHOWING WORKINGS IN THE UPPER DRUMGRAY COAL



Location Plan (1:2500)



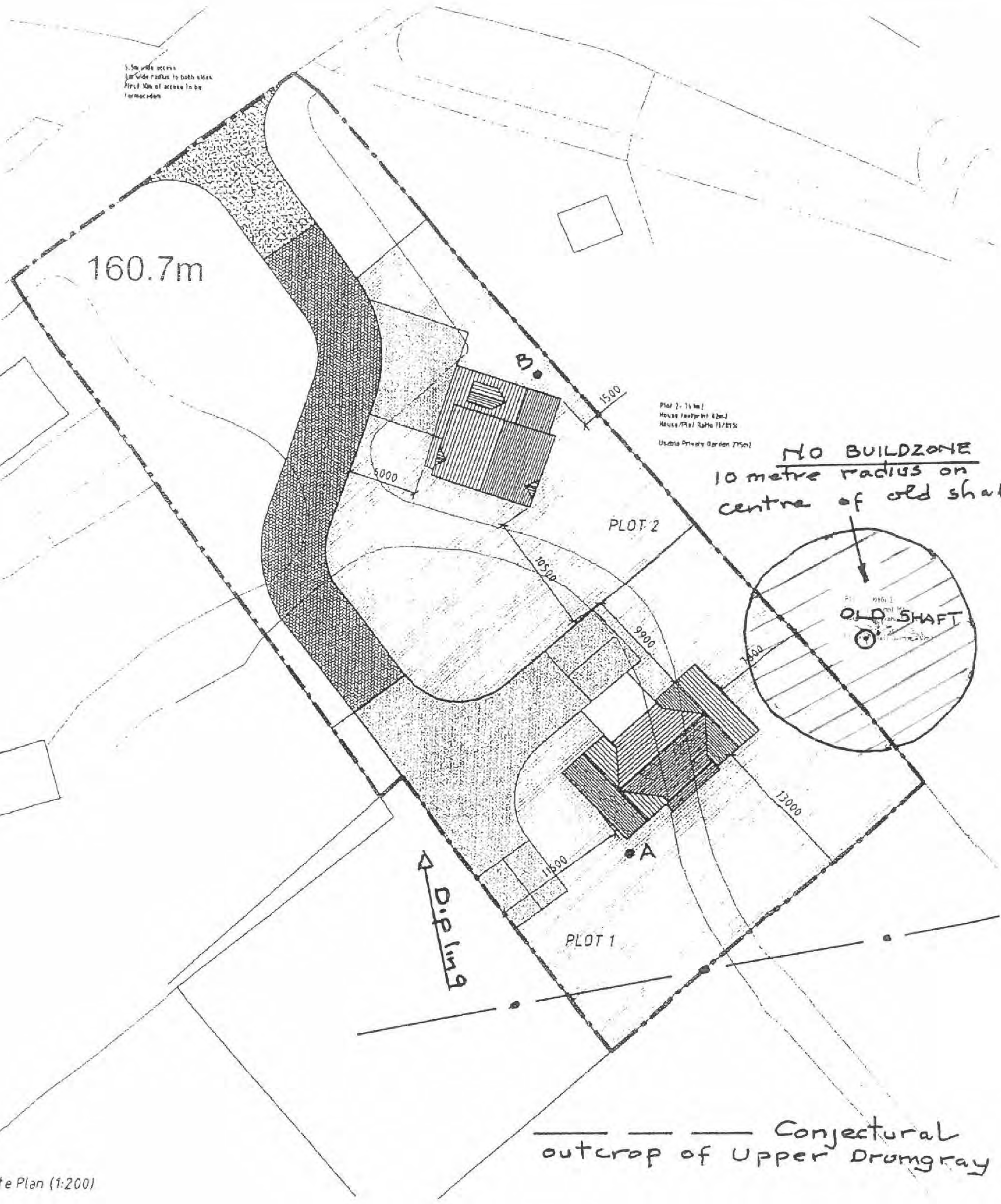
PLOT 1 - 1680m²
House footprint 160m²
House/Plot Ratio 1/11.1%
Usable Private Garden 44.1m²



title: Site Plan	
client: Mr & Mrs J Green	
project: Proposed House Standburn Falkirk	
scale: 1:50/1:100 @ A1	date: May
drawing number: 17/029/PL01	
HARDIE ASSOCIATES 78 HOPETOUN STREET BATHGATE WEST LOTHIAN EH48 4PD TEL: 01506 833879 FAX: 01506 834656	

APPENDIX 3

PLAN SHOWING NO BUILD ZONE AROUND OLD SHAFT



Site Plan (1:200)

SCALE 1:500

APPENDIX 4

METHODS OF MINING

METHODS OF MINING

Two methods of mining have been used in the past to extract minerals from stratified deposits namely the stoop and room system, and the longwall system.

STOOP AND ROOM.

In this method, passage ways or rooms are driven, more or less at right angles to each other through the seam which is thus formed into square or rectangular blocks or stoops.

These stoops are formed in the "first" working, the workings being extended to the limit of the royalty. At the limit of the royalty, the stoops or part of the stoops are removed on retreating back to the shaft, this was some times referred to as the "second" working.

Depending on the depth to the mineral being extracted, thickness of mineral, and condition of the roof and floor, extraction rates of up to 80% could be achieved by this method.

The width of the rooms and pillars depended on depth to the mineral, thickness of mineral and condition of the roof and floor.

These stoops may continue to perform their function of supporting superincumbent strata for many years. However, depending on circumstances, the stoops can eventually fail causing subsidence and movement of the ground, and in the case of very shallow workings plump holes may be formed at the surface.

LONGWALL SYSTEM.

In this method the seam is completely extracted by means of dividing the seam into panels. The strata overlying the mined area is allowed to subside, and as a result all subsidence is normally completed shortly after the extraction of the seam.

However in the case where little or no rock cover exists over the workings instability could result due to the presence of old roadways remaining open.

Site Investigation Report: Flood Risk Appraisal

**For Proposed
Development Site**

at

Standburn

Falkirk

December 2008

Prepared for

George Paterson

by

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1. Introduction

A flood risk appraisal was carried out during December 2008 at Standburn, Polmont, Falkirk as part a series of site investigations for a proposed development of three dwellinghouses adjacent to existing housing. The three houses are proposed for the southern part of the site on the highest ground, with the lower ground being garden/amenity space and for access. The proposed development area (NS 927 746) is a brownfield site and was previously occupied by 70 houses but is currently includes mix of hard standing, gravel track, and some developing scrub, with patches of tall ruderals and brambles and is situated south of and adjacent to the B825 on ground rising southwards away from the road. At the northern side of the road a small burn, the Bowhouse burn [which originates approximately 0.5km northwest (NS 921 747) of the site] runs eastwards adjacent to the road, culverted northeast of the site to pass under the road and re-emerges in a field east of the proposed development area. It is the presence of this burn that resulted in Falkirk Council requesting a Flood Risk Assessment report as part of the submissions to the Planning Authority for the planning application for the proposed development.

2. Catchment Description

The Bowhouse burn is a small burn and is a tributary of the river Avon. The upper catchment of the Bowhouse burn is very small at >1km², with the burn arising at NS 921 747 approximately 500m northwest of the proposed development area from marshy ground at approximately 165m above sea level (ASL) in a wide valley between four gently rising hills between 180-190m ASL in a post glacial "rolling hills" landscape. The burn runs southeast and enters the village of Standburn just across the B825 from the proposed development area, is canalised adjacent to the road over a 30m length, then passes through a culvert under the road (NS 927 747), and re-emerges 50m away to the southeast in the adjacent field, where it enters and follows a steep-sided V-shaped valley down to Bowhouse, and on to the confluence with the river Avon another 2km to the east. A topographical map of the area with contours can be viewed at:

<http://www.ordnancesurvey.co.uk/oswebsite/getamap/>

Note: The burn bed sits at least 1.5m below the bank top. Flood water levels have not been known to exceed the bank top in the last 20 years.

3. Proposed Development Site Levels

The northern edge of the site boundary of the proposed development area is situated a minimum of 1.5 metres above the bank top of the burn but the with the bulk of the site at least 5m above the bank top of the burn, and the nearest possible location for a house on the site is 2.5m above the level of the burn.

4. Flood Risk Appraisal

The Scottish Executive directed SEPA to indicate areas in Scotland where there is a 0.5% (1:200) or greater probability of being flooded in any given year. SEPA produced an interactive 1:25,000 scale Indicative River and Coastal Flood Map for Scotland, which can be viewed at (<http://www.sepa.org.uk/flooding/mapping/>). This map includes the potential flood risk envelopes for rivers and burns with catchments >3km² and from the sea. From this interactive map it was determined that the nearest location to the proposed development site to potentially be affected by flooding from rivers is almost 2km downstream to the east at NS 946 751, just east of the A801 road at Bowhouse. There is therefore *no estimated 1:200 or greater flood risk* identified by SEPA for the Standburn village area from any catchment >3km².

However, this assessment by SEPA is based on the current risk from flooding only AND for catchments >3km². It cannot take any exceptional localised flooding due to unpredictable factors such as backing up of water volumes due to the burn channel becoming impeded or blocked by debris at "pinch points" during flood events into account due to their unpredictable causes and nature of the event.

SEPA has also noted the following considerations for users of the flood data on their website:

"It does not provide enough detail to accurately estimate the flood risk associated with individual properties or specific point locations. Local factors such as flood defence schemes, structures in or around river channels such as bridges, buildings and other local influences, which might affect a flood, have not been included. Furthermore, the flood map only shows flooding from rivers or the sea and does not account for flooding from other sources such as surface water runoff, surcharged culverts (where rivers which have been channelled underground flood) or drainage systems."

"The flood map provides an overview of flood risk only and, given the inherent uncertainty in flood estimation methods and the main input dataset, further detailed local studies may still be required to accurately assess the risk of flooding for a local area or to provide an indication of flood risk for a specific location or property. It is not suitable for determining flood risk for insurance purposes or property enquiries."

All users of the map should take into account:

- It is based on a digital terrain model with a vertical accuracy in the range 0.7m – 1.0m, on a grid spacing of 5m;
- It is not relevant to catchments below 3km²- which the local catchment is.
- It does not attempt to take account of surface run-off, surcharged culverts, blockages and structures such as bridges or buildings which can significantly affect the flow of water;
- It does not take account of flood prevention schemes and coastal defences."

5. Conclusions

Given the site elevations, location relatively near the "headwaters" of the small burn, gradient of the road between the proposed development site and burn (serving as a dry swale in effect to take water away from the development site and run it away downhill to the west), and historical information provided by local residents it is estimated that there is no significant flood risk (1:200 year or greater) to any property that may be built on the proposed development site. The catchment is too small at <3km² for SEPA to include in their on-line flood risk assessment database (indicating a low risk), and at <1km², the upper catchment of the burn is so small that any flooding risk potentially caused by the burn would be highly localised and due to an extraordinary event rather than as a part of a typical flooding pattern for the burn. A major blockage of the watercourse and surcharging of the culvert etc. would be the most likely event that may cause elevated water levels above the normal peak elevated levels typically experienced during storms. Even if the culvert were to become surcharged, the general topography of the area and road gradient which drops away 1.75m along the road from east to the west of the site would ensure that any floodwater would run away along the road to the east before it would result in a flood that could threaten the proposed dwellings on the proposed development site.

Historically, there are no records of catastrophic flood events in Standburn during the last 20 years.



Note: This assessment is based on the information available at the time of reporting in the form of SEPA data, topographical information, historical data, perceived normal maximum levels of run-off, and site levels, and the author accepts no liability for any developmental issues regarding present or future use of the study area (including ecological and environmental). No hydraulic modelling was performed as part of this assessment.

Figure 1. Site and watercourse location



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Key

-  Indicative site boundary
-  Indicative route of burn (culverted section indicated by dotted line), and arrowhead indicating direction of flow