

17/2/89

(33)

EIS 63

**ESB / EC VALOREN PROGRAMME
SMALL HYDROPOWER SCHEME**

**LOUGH FADDA / LOUGH BEG
BLACKWATER, CO. KERRY**

**PART III
ADDITIONAL DOCUMENTATION**

**REF. 19 : ENVIRONMENTAL IMPACT
STUDY**

NOVEMBER 1989

**DEVELOPMENT, PLANNING & HYDRO DIVISION,
ESB INTERNATIONAL**

THE ENVIRONMENTAL IMPACT
OF A PROPOSED MICRO-HYDRO
ELECTRIC POWER DEVELOPMENT
AT LOUGH FADDA AND LOUGH
BIG IN COUNTY KERRY

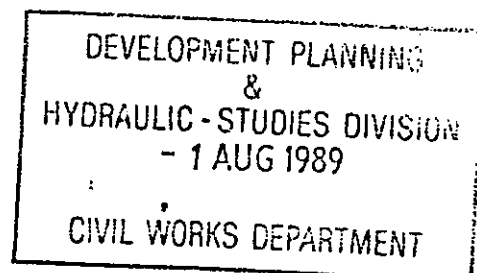
A Report Prepared for
the Electricity Supply Board

by

CAAS (Environmental Services)
Ltd

June 1989

Eanna ni Lamhna
Roger Goodwillie



<u>Table of Contents</u>	Page
1. Introduction	2
2. Scheme Proposals	3
3. Site Description	4
3.1 Lough Fadda	4
3.2 Outlet Stream from Lough Fadda	4
3.3 Lough Big	5
3.4 Outlet Stream from Lough Big	5
3.5 Landscape Quality	6
3.6 Ecological Interest	6
3.7 Recreational Use	7
4. Environmental Impact Matrix	8
5. Environmental Impacts During Construction	9
5.1 Access to the Lakes	9
5.2 Embankment Construction	9
5.3 Excavation for Gravity Pipe and Penstock	10
5.4 Screening for Fish	11
5.5 Powerhouse, Powerlines and Tailrace	11
5.6 Noise	12
6. Environmental Impacts During Operation	13
6.1 Lake Levels	13
6.2 Changes in Flow Levels in Outlet Streams	13
6.3 Diminution of Wilderness Quality	14
6.4 Socio-Economic Effects of Scheme	14
7. Summary and Conclusions	16
References	16

1. INTRODUCTION

This environmental impact study has been prepared for the Electricity Supply Board on foot of a commissioning letter dated 15th June 1989, reference PJK/MH. The project it assesses is one of a number of micro hydro-electric schemes proposed for construction under the EC Valoren Programme.

This study considers the impact of the proposals for Lough Fadda and Lough Big (site number 32). The site lies on the south eastern side of Knocklomena, near Kenmare, Co. Kerry.

In writing the Report, note has been taken of the broad criteria laid down in the 1985 EC Directive on the assessment of the effects of projects on the environment. This Directive became law in Ireland in July 1988.

2. SCHEME PROPOSALS (Figure 1)

The scheme involves placing a water level regulation (embankment and weir) at the outlet of Lough Fadda (level 296 m OD) with a gravity feed penstock (200 mm diameter) to direct the outflow to adjacent Lough Big which is approximately 500 m away and at level 278 m OD.

The intake for the micro hydro scheme will be at the outlet of Lough Big and will require the installation of a water level regulator. The penstock will be 2,000 m long and 400 mm in diameter.

The powerhouse will be situated at 85 m OD, thus the gross head will be 193 m. The powerhouse will be fully automatic, containing the turbine, generator transformer, and associated compound and gear-handling apparatus. There will be a tailrace from the powerhouse into the outlet stream and the electricity will be fed into the national grid via overhead cables on single wooden poles.



3. SITE DESCRIPTION

3.1 Lough Fadda

Lough Fadda is a long, scenically attractive lake set into a glaciated valley at 295 m OD between Knocklomena Mountain and Boughil Mountain. From the south it is approached across a rising rocky heath with patches of blanket bog, wet grassland, and nearer the outflow, several rocky morainic outcrops. The plants Juncus Acutiflorus (rush), Viola Palustris (marsh violet) and Pinguicula Grandiflora (butterwort) are characteristic of the wet peaty grassland, with extensive stands of Juncus Effusus (common rush) on the mountain side SW of the lake. Calluna (ling heather), Myrica (bog myrtle), Molina (purple moor grass) and Scirpus (sedge) make up the majority of the blanket bog vegetation. Occasional trees and bushes of holly, willow (Salix Cinerea), and rowan (Sorbus Ucuparia) grow in rocky crevices where they have escaped grazing. Little vegetation occurs in the lake itself.

The lake has a stable water line, surrounded on all sides by large wave-washed rocks. Clefts in these rocks are filled with moss and have Saxifraga Spathularis (St. Patricks cabbage) and Thymus (thyme) which also grow on the rocky scree slope above. The western side of the lake is considerably steeper than the east, where there is an obvious walking route between Lough Fadda and the neighbouring, smaller, Lough Big.

3.2 Outlet Stream from Lough Fadda

The lake is drained by a tributary of the Kealduff River, itself is a tributary of the Blackwater which flows into Kenmare Bay. The outlet stream is relatively narrow but swift. It escapes in a zig-zag course through the boulders of the moraine which created the lake. What

appears to be an old dam or wall crosses the exit but has no noticeable control on the outflow. It is joined by several tributaries and drains.

It flows rapidly down to the small road which winds round Knocklomena Mountain and continues in a western direction to join the slow-flowing Kealduff River which passes through a broad valley. (see Figure 1). It transects a large expanse of untouched blanket bog on both sides of the road. On the east side of the road it falls in a series of rapids. The river banks on the west side of the road have trees and shrubs growing on them. In its lower reaches the stream has good spawning grounds for both salmon and trout.

3.3 Lough Big

Lough Big is about half the size of Lough Fadda. It is roughly circular in shape and lies lower down to, the south east, at 278 m OD. It is approximately 500 m from Lough Fadda from which it is separated by a spur of Boughil Mountain. From the south it is approached across a rising rocky heath with patches of blanket bog. The vegetation surrounding the lake, and in the lake itself, is similar to that described above for Lough Fadda - vegetation typical of south western upland heath and blanket bog.

3.4 Outlet Stream from Lough Big

The lake is drained by an outlet stream which flows due south to the Dereendaragh River, a tributary of the Blackwater River, which also flows into Kenmare Bay. Thus these two lakes, Lough Fadda and Lough Big, have outlet streams which flow into two different tributaries of the Blackwater. This outlet stream flows rapidly through rocky heath in its upper reaches, then more slowly through blanket bog. It crosses the

Sneem/Killarney road after two kilometres, then flows through blanket bog on the western bank and cultivated fields on the eastern bank for another kilometre to the Dereendaragh River. It is joined by several small streams and drains.

3.5 Landscape Quality

The lakes lie in a remote scenic area. They are isolated from the nearest road and reaching them involves crossing a mile of upland heath and blanket bog. The lakes themselves lie in an area of wilderness - no sign of man is evident from the lake-shores, and conversely, neither lake can be seen from any of the roads in the area.

Both Lough Fadda and its neighbour Lough Big are in an area designated as outstanding landscape in the Inventory of Outstanding Landscapes in Ireland, An Foras Forbartha, 1977. In the 1983 Kerry County Council Development Plan they are zoned as a secondary special amenity area. It is the policy of the Council to limit development in such areas to a level and to siting consistent with the preservation of the natural beauty and the scenic amenity of the area, including the preservation of good views and prospects. However, it should be noted that neither the penstock nor the powerhouse lie within either of these designated areas. There are no plans to afforest any of the area under consideration in the report.

3.6 Ecological Interest

Both lakes and both outlet streams have a stock of fish. The fish in Lough Fadda are mainly isolated from those in the outlet stream, and passage from one to the other is difficult. The lake itself, according to O'Reilly (1987), is intensively stocked with (mainly) rainbow trout of average weight one pound. The outlet stream has good spawning grounds for both salmon and wild trout in its lower reaches (Department of the Marine Communication)..

LOUGH FADDA

The fish in Lough Big can pass into the outlet stream and down to the Blackwater River. An electro-fish of both outlet streams was carried out recently by the South Western Regional Fisheries Board and revealed that each contains considerable numbers of small trout and are thus good fish feeder streams of the Blackwater. As the electro-fish was not carried out during the appropriate season, no salmon were found, but their presence is not ruled out.

3.7 Recreational Use

The area has a consistent if low level of use by hill walkers since it is close to Killarney and particularly to the youth hostel in the Black Valley - however, it is not included in any guide to walking routes as far as could be ascertained.

4. ENVIRONMENTAL IMPACT

The probable impacts of the proposed scheme are outlined on the simple impact matrix shown in Figure 2. Impacts during the construction and operational phases are identified separately.

The impacts on vegetation and wildlife will occur mainly in the construction phase, while impacts on visual quality may be possible during both phases. Chapters 5 & 6 discuss these impacts in detail and make suggestions for their alleviation where they are negative.

Figure 2: Impact Matrix for Proposed Micro-Hydro Power Scheme at Lough Fadda/Lough Big, Co. Kerry.

ENVIRONMENTAL CONSIDERATION	Veget'n	Wild Life	Water Quality	Stream Flow	Peat Stability	Landscape Wilderness Quality
SCHEME ACTIVITY:						
Access	C	C				C
Embankment	C	C/O	C	O		C/O
Penstock	C	C/O		O	O	C
Powerhouse	C	C		O		
Tailrace	C	C/O				
Overhead Cables	C	C				O
Noise		C				C

KEY

C = Impact during Construction

O = Impact during Operation

Blank indicates no discernable impact

5. ENVIRONMENTAL IMPACTS DURING CONSTRUCTION

5.1 Access to the Lakes

Figure 1 shows the existing position. There is access to a farmhouse from the small road that goes around Knocklomena, and from this farmhouse a new access road up to the 240 m contour has recently been built by the farmer. These roads will allow access by machinery.

From the end of the road, access will be needed to both lakes in order to construct the embankments and to install the gravity feed pipe. At this height there is much rocky heath. Local stone found in the area of the lakes is to be used for the embankment, the gravity feed pipe is a small 200 mm pipe, and the upper reaches of the penstock are of a light weight polyethylene so that the transport of heavy materials at this height will not be a major issue.

It is recommended that a low pressure, tracked, vehicle carry any material on site; that areas of rocky heath rather than blanket bog be chosen as the route if at all possible; and that a different route be taken on each trip to avoid track marks. These measures will reduce pressure on the vegetation and minimise the possibility of peat erosion.

5.2 Embankment Construction

The embankments are to be constructed of gabions of local stone with a waterproof membrane inside. That at Lough Fadda will be between one and two metres high and will have a length of between 10 m and 53 m. There is already an old stone weir here of the dimensions of the smaller of these two proposals and the stone from this will be used in the construction of the new embankment.

To allow for whatever passage of fish there is between the lake and the outlet stream, the compensation pipe through the embankment should be left unscreened. At Lough Big, the embankment will be between one and two metres high and if the former, will be 6 metres wide. It will be constructed of gabions of local stone found in the area and the compensation pipe through it must be left unscreened to allow for the passage of fish.

5.3 Excavations for Gravity Pipe and Penstock

A gravity feed pipe approx. 500 m and 200 mm in diameter will be laid to direct the outflow from Lough Fadda to Lough Big. This pipe should be laid by hand rather than by machinery. The vegetation and attached top layer of soil should be removed over the width of the trench and stored on polythene sheeting on the far side. Deeper excavated material should be stored separately from this top layer. The excavated material should be returned in sequence following the pipe laying, with the deeper material being left as surplus and the vegetation layer returned in its entirety. The work of making good should proceed in parallel with the pipelaying so that the vegetation is exposed for as short a time as possible. These measures will ensure that no scar of different vegetation will mark the position of the pipe.

The penstock will be laid on the eastern side of the outlet stream of Lough Big (see Figure 1). Some of this pipe, particularly in the lower reaches, will go through blanket bog and care will have to be taken to prevent the destruction of surface vegetation, the causing of a permanent visual scar and the development of erosion channels.

The trench will be excavated by a pipe laying machine which moves on its own mats subjecting the soil to minimum pressure. The top layer of

vegetation and attached soil must be removed first and stored on polythene sheeting along the trench so that it can be replaced as intact as quickly as possible. Following pipe-laying, plastic netting should be secured across the surface of the trench on steep ground to prevent erosion. This may be removed after two years.

Reseeding with Agrostis Tenuis and Festuca Rubra grasses could be carried out, if necessary, on the restored trench through the mineral soil - but not on the peat bog.

5.4 Screening for Fish.

As the streams and Lough Big are significant in terms of fish, the following regulations for screening have been agreed with the Department of the Marine and the South West Regional Fisheries Board.

Intake: bar spacing < 10 mm: approach velocity < 30 mm/s at 50% blockage.

Outlet: bar spacing < 10 mm: outlet to be designed to drown out turbulence upstream of spawning beds and so as not to unduly attract fish.

As the gravity feed pipe will be unscreened there will be passage of fish from one lake to the other. Passage of fish in both streams will be maintained by having the compensation pipes through the two embankments unscreened.

5.5 Powerhouse, Power Lines and Tailrace.

The powerhouse is proposed for a site in the valley at 85 m OD. This is adjacent to the Killarney Sneem Road and is in an area of small fields. There are dwelling houses close to the

south. The powerhouse should have a pitched roof and should be in traditional colouring - dark roof and white or grey stone walls.

The powerlines should go from the powerhouse to the road following the field pattern. As they will be on single wooden poles their effect on the landscape will be small.

The stream should be protected against erosion from the tailrace by appropriate concrete and stone work in the stream bed and banks. The outlet should be screened as outlined above.

5.6 Noise

Construction work will inevitably have a temporary effect on vegetation in the area and use of machinery will cause noise unwelcome to bird and animal life. There are no records of rare or endangered species of birds, animals, or plants in the area (Forest and Wildlife Service Communication) Thus these temporary effects are judged not to be significant.

6. ENVIRONMENTAL IMPACTS DURING OPERATION

6.1 Lake Levels

The embankments will raise the water level of both lakes. Lough Fadda has steep sides on the east and west so any flooding of the lake caused by the embankment will be mainly to the north east where the lake edge is flatter. Lough Big has steep sides except at the south so any flooding of vegetation would take place here. An increase in the size of either lake would affect the marginal vegetation particularly in summertime, but this would not be significant.

6.2 Changes in Flow levels in Outlet Streams.

As both of these streams are good fish feeders of the Blackwater the Department of the Marine, following consultation with the South Western Regional Fisheries Board, has indicated that the following flows should be ensured:

Lough Fadda Outlet Stream:

10% of the mean flow (or the dry weather flow) should be provided as compensation flow at all times

Lough Big Outlet Stream:

12.5% of the mean flow (or the dry weather flow) should be provided at all times

Furthermore, there may be additional requirements during the salmon season, if the streams are found to be important for salmon during future electro fishing.

6.3 Diminution of Wilderness Quality

Neither the embankment or the intake will be particularly noticeable in the broken terrain of the lake exit and stream. However, since these are a major point of interest to the walkers visiting the area, there will be a negative impact on people's enjoyment. The area at the moment is a wilderness removed from the influence of man, and the embankments will be an introduced feature. This feature will, however, be visible only in the immediate vicinity and cannot be seen from any of the surrounding roads. Sufficient water will be available in the stream for the rapids just east of the road and west to the Kealduff River.

6.4 Socio-economic Effects of the Scheme

The power generated by the scheme will be available for use in an area currently remote from ESB power stations. Transmission losses that are experienced at present will be eliminated. The supply will be more dependable, and a three-phase supply, suitable for light industry, will be available for the first time in the area as a result of the development. This will constitute the major benefit to the local economy. No adverse economic impact is anticipated.

During construction there will be some small amount of local employment but when operating, the scheme will function without any staff on-site.

At national level, two further benefits may be identified. Firstly there is the net economic benefit to the economy of substituting domestically produced hydro-power for power generated from imported fossil fuels. This may be quantified.

Secondly, the development of the remote control system for the reservoir will result in a design of telemetry (data-acquisition and tele-control) which will have general application e.g. remote control of potable water reservoirs, sewerage systems etc. Such technology offers considerable potential as an export product, although it is not possible to quantify such a benefit.

7. SUMMARY AND CONCLUSIONS

The main effect of the micro hydro electric scheme at Lough Fadda and Lough Big will be on the fish in the outlet streams of the Loughs. If the recommendations made by the Department of the Marine are adhered to, this effect will be minimised.

A subsidiary impact of the development will be to bring a man made structure into a wilderness area designated as of outstanding landscape and used by hill-walkers. If carefully carried out, the physical effects will be on a small and local scale, and not seen at all by motorised tourists.

The socio-economic impact of the development is positive at both local and national level.

References

1. O'Reilly P. (1987) Trout and Salmon Loughs of Ireland Unwin Hyman, London

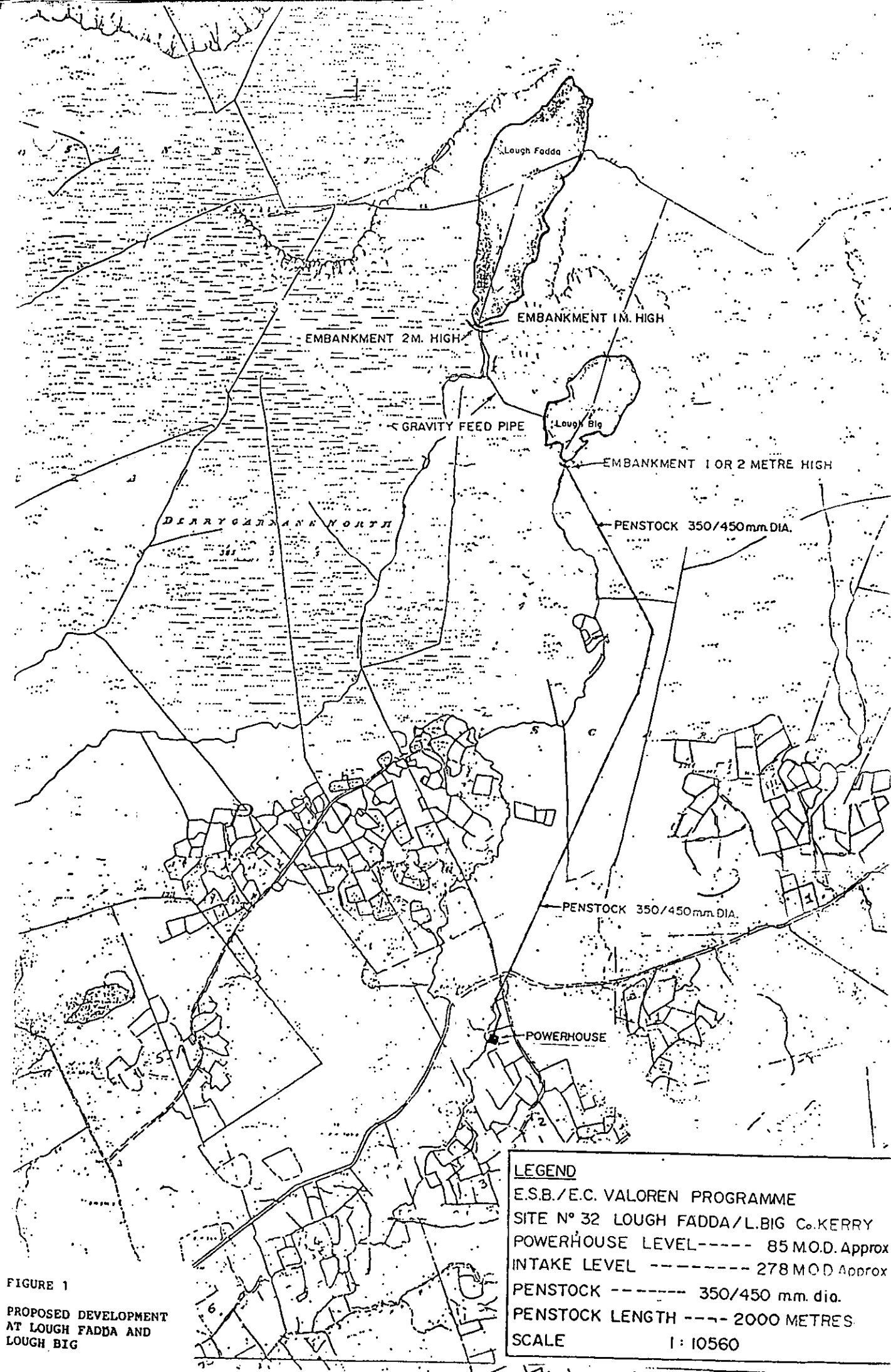


FIGURE 1
 PROPOSED DEVELOPMENT
 AT LOUGH FADDA AND
 LOUGH BIG