10.1 Introduction

This chapter of the Environmental Impact Statement (EIS) provides a description of the existing hydrology and surface water regime in the vicinity of the proposed development site at Pass of Kilbride, County Westmeath. The surface water section establishes baseline conditions in the area, in terms of flood risk, general site drainage and surface water quality.

Additionally this chapter will assess the potential impact of the proposed development on the surrounding surface water environment.

10.2 Study Methodology

A desktop study was undertaken in January and February 2004 to obtain and examine existing surface water data in order to predict potential impacts of the proposed development on the surrounding environment. The desktop study was supplemented by site-specific investigations. This information was used to establish the baseline conditions in respect of water quality, general site drainage and flood risk assessment. An assessment was made of the unmitigated impact that the development could have on the local environment. Following on from this a number of mitigation measures were introduced to maintain and / or improve the current hydrology and drainage status of the proposed site and local area.

The approach outlined above included design calculations for potential surface water management features for the final site development profile, including flood balancing and sedimentation ponds. All relevant calculations are included in Appendix 10.1.

10.3 Desktop Study

The desktop study comprised a review of existing published data pertaining to the general area around the site of the proposed development area. The main sources of information for the study were:

- Met Éireann meteorological data, in particular rainfall and evapotranspiration data;
- EPA Parameters of Water Quality - Interpretation and Standards 2001;
- EPA (interactive) River Quality Map (http://www.epa.ie/rivermap/data/N13.html);
- Consultations with the Eastern Regional Fisheries board.

The main findings of the desktop study are described in subsection 10.5 below.

10.4 Site Investigation

A site investigation was carried on the 10/12/03 by Enviros staff in order to identify the location of all surface water drains, ditches and streams in the vicinity of the proposed development area. The main features identified during this investigation are shown on Figure 10.1.

A total number of seven surface water s
SW6 and SW4A (Figure 10.1). Water sa
10/12/03. Details of sampling procedur
Sampling Procedure. All samples were d

A second set of water samples were co
downstream of the site and referenced S
confirm previously recorded results.

A list of baseline parameters was exan
Application guidelines. All surface water re
National Regulations SI No. 439 of 2000
Regulations, SI No. 294 of 1989.

Flow measurements of the stream were a
area.

The results of the site investigation are di
section.

10.5 Receiving Environ

10.5.1 Surface Water Features

The site is located in Co. Westmeath appr
lying area. The land is characterised by
extensive peat bog cover to the west and

There are a number of watercourses in the
to the northwest of the site comprise
interconnect to form a main drain. This
tributary of the Kinnegad River at the no
northern boundary of the proposed site. A
the eastern boundary. This ditch also disc

The proposed site is bound to the northw
extraction are evident to the west, while a
The peat reaches depths of up to 4.0m on

Militownpass Bog is located to the south o
habitat in Europe and one that is becomin
is a Natural Heritage Area (NHA-site code
for future generations.

The eastern portion of the proposed site is covered by up to 1m of peat. This area is soft underfoot and poorly drained, but is part of the field in which arable farming took place. The main portion of the proposed site is covered by a glacial till which is described as a sandy clay or sandy silt.

The peat to the northwest and west and in the east is generally well decomposed and amorphous. Such peat tends to be of low permeability. Till generally exhibits higher permeability than the peat, but the permeability is largely a function of the fines content of the till.

The generally flat terrain, the generally low permeability of the surficial deposits and the large number of deep drainage ditches indicate that this area is naturally poorly drained and is highly susceptible to runoff.

The closest designated watercourse to the proposed development area is the Royal Canal (Natural Heritage Area (NHA): site code No: 002103), located approximately 5 km to the north of the site. Lough Ennel (pNHA site code No: 000685, a candidate Special Area of Conservation (SAC site code No: 000685) and Special Protection Area [SPA site code No: 004044]) is located approximately 15 km west of the site. The River Boyne is located approximately 17 km east of the site. Other watercourses in the vicinity of the site include:

- Brosna River, a tributary of the Shannon, located approximately 14 km to the west / southwest of the site;
- Riverstown River, a tributary of the Deel (Rahaarney) which flows into the Boyle, located approximately 7 km to the north / northeast of the site;
- Kinnegad River, a tributary of the Boyne, located approximately 1.5 km to the east of the site; and
- Milltownpass River, a tributary of the Castlejordan River which flows into the Boyne, located approximately 2.5 km south of the site.

10.6 Surface Water Quality

10.6.1 General Area

Biological and physico-chemical river water quality have previously been monitored and recorded by the EPA at a number of locations in the surrounding area. A five point scale of numerical quality values, Q1 to Q5, has been used in Ireland since the 1970s to determine water quality in the absence of chemical data, where Q5 represents unpolluted waters and Q1 represents seriously polluted waters.

The scheme mainly reflects the effects of biodegradable organic wastes on communities of the larger (macro) invertebrate species which inhabit the substrata of all rivers and streams and are pollution sensitive.

Conditions in the vicinity of the site were obtained from the EPA (interactive) River Quality Map (EPA, 2004a). The monitoring location nearest to the proposed site is on the Kinnegad River at a bridge south east of Clonfad House (station number 0060) and has a biological water quality rating of Q3 - Q4 (slightly polluted) (cf. Appendix 10.2). A second monitoring point downstream of this location at station number 0100 has a water quality rating of Q3.

This EPA river quality information provides an indication of anthropogenic influences on the environment by humans and natural changes in the river water quality, establishing baseline conditions of all rivers and streams in the locality.

The Kinnegad River is very important from a fisheries point of view. Recent and ongoing surveys have shown that substantial populations of salmon, brown trout, brook lamprey, crayfish, stone loach and gudgeon inhabit the water body. Under Annex II of the European Habitats Directive (92/43/EEC) species such as salmon, brook lamprey and crayfish are listed as protected species. The Kinnegad River is also an important salmonid nursery with extensive spawning evident in the upper reaches (N. McGloin, Eastern Regional Fisheries Board, April 2004).

10.6.2 Proposed Site

In addition to the general water quality i
assessment on the 10/12/03 to assess
described in Section 10.4 above. Monitc
sheets are provided in Appendix 10.4.

The test results were compared with the li
for human consumption. Water quality w
potassium and sodium levels were obse
during both sampling rounds. Metals su
satisfactory limits at all surface water l
acceptable limits throughout the assessm

A slight increase in chemical oxygen der
SW1, SW2 and SW3 between December
recorded at SW5 and SW6 during the initi
within satisfactory limits at these monitori

Total organic carbon (TOC) levels were
second round of monitoring. Biochemi
throughout at all locations and within acc

All watercourses were flowing, as obser
Water levels in ditches below ground leve
2 and 3 indicated on Figure 10.1 had
respectively. The topography of the site
the north of the site to 85.5 in the east.

10.6.3 Surface Water Flow

Flow measurements were carried out as p
boundary. The results suggest that t
approximately 107l/s, while in the drainag
dry weather and is not expected to repres

Run-off calculations were undertaken to
in particular to the peak storm flows at the
characteristic discharge from the mean a
flood discharge from the site.

The model uses six variables as explained
may be used to estimate the mean annua
developed by the UK Institute of Hydrolo
Stormwater Management Policy for Deve
the Irish situation more closely than the n

$Q_{BAR} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times$

where Q_{BAR} = the mean annual peak flo

AREA = area of the catchment (km^2)

SAAR = Standard Average Annual Rainfa

SOIL = a term to describe the runoff susc

(cf. Appendix 10.1 for a detailed descripti

The SOIL term for the model takes account of the extent of different surface soils which control the infiltration and runoff characteristics of a site. Borehole and trial pit logs from the intrusive site investigation (cf. Chapter 11) were used to evaluate the current condition of the site in terms of permeability and surface runoff susceptibility. The site investigation found that the site was generally overlain by thin peaty topsoil overlying between 1.0m and 3.0m of sandy gravelly clay (till), over sandy gravel. The eastern portion of the site, approximately 9.5ha is covered by up to 1.0m of peat. The derivation of the SOIL value is shown in the Appendix.

The calculations showed that in its current state, the site's peak flow is approximately 109l/s, assuming 9.5ha of peat with low infiltration and 8ha of till with moderate infiltration, and using the Standard Annual Average Rainfall (SAAR) in the locality for 2002 of 841 mm (Met Éireann Data 2003). The equivalent result where the entire site is considered to have low permeability is 134l/s.

The mean annual peak flow from the catchment using the same model was estimated to be approximately 3,060 l/s.

10.7 Proposed Surface Water Management System

The facility will comprise approximately 4.8 hectares in area and will be constructed on a concrete pad, designed to collect all surface water runoff from the process and non-process areas. Surface water runoff from the process hardstanding areas will be recirculated into the process to maintain optimum moisture content in the waste. Surplus runoff collected from these areas will be stored in a leachate collection tank and will be treated in the leachate treatment plant, as described in Section 4.8.2, prior to discharge directly into the stream in the north, subject to EPA Emission Limit Values. The leachate collection system is shown in Figure 4.3.

Vehicle washing will be carried out on the return from the waste delivery area. Wash water will be contained in a circulation system at the vehicle wash and will be augmented by a freshwater supply. Mud and silt will be settled out in a separate tank and disposed of to landfill.

The surface water runoff from the paved non-process areas, such as the storage and loading areas and car park, will be collected by grading these areas to gullies which will discharge to the surface water drainage system. The collected runoff will discharge via a silt trap and oil/water separator to the stream that runs along the northern boundary. Runoff from the site access road will be collected by a drain along the road and will discharge to the eastern drain via a silt trap and oil/water separator.

Rain water from roofs will be intercepted by a dedicated roof water collection system. This will be discharged directly to the surface water discharge point, downstream of the silt trap and oil/water separator.

The system will be designed in accordance with relevant standards. Figure 4.4 shows the details of the proposed surface water management system for the facility.

10.8 Potential Impacts of the Proposed Development

During all stages of the proposed development (construction, operation and decommissioning/ restoration) the permeability and runoff characteristics of the area and the local topography around the proposed development will be altered. As a result of this there will be an impact on the surface water environment. The effects on the surface water environment are expected to be greatest down gradient of the site. The impacts are described below, followed by measures that can be put in place to mitigate these impacts.

10.8.1 Flow Rate Impacts

The facility will be constructed mostly in the area currently underlain by till. Consequently, the nature of surface water runoff conditions will change on the site, as the moderately permeable till is replaced by virtually impermeable concrete.

The runoff calculations for the facility therefore assume that all rainfall falling management system. The control and r generates large flow volumes, particular large volumes of water relatively quickly areas down-gradient of the site, and pos

10.8.2 Water Quality Impacts

The facility will contain substances whicl site, such as compost leachate, engine solids) etc. The ways in which these cor below.

Leachate

Leachate is the product of any liquid perc soluble materials, chemicals and susper

Inappropriate work practices, such as d could give rise to leachate entering the s could enter the surface water collection

Fuel Storage

Without procedures to control the mani significant risks to surface water from sp

Firewater

Contaminated firewater may arise from fi response procedures, firewater may ente features adjacent to the site, carrying po

WC Facilities

WC facilities will be provided for on-site environment, if not correctly controlled a

Suspended Solids

The proposed activity has the potential t during the construction and operation vegetation during construction, the increa could increase the amount of suspendec

Spills of green or mixed waste or compo being washed into surface water colle discharging from the site.

10.9 Do-nothing Scena

Under a do-nothing scenario, there wou surface water environment in the vicinity cutting, pruning and general managemer

The proposed location would remain unc

10.10Mitigation Measures

The following subsections describe measures which will be incorporated into the design and operation of the facility to mitigate against the potential impacts of the development of the site, as outlined above.

10.10.1 Flow Rate Impacts

Site measurements suggest that the flow in the stream was approximately 107l/s. This rate was measured during dry weather and is not expected to represent a peak flow for the stream. The mean annual peak flow in the stream is estimated to be approximately 3,000l/s (cf. Section 10.6.3)

The mean annual peak flow from the existing site is estimated as 109l/s, which represents just 3.6% of the mean annual peak flow in the stream.

The assessment of changes in the peak flow rate from the site indicated an increase of between 123l/s and 134l/s, 13% and 23% of the current peak flow from the site, applying the same model used to assess the existing site. This is an increase to between 4.0% and 4.4% of the mean annual peak flow in the stream. These calculations ignored the process water requirements of the facility.

However, the design of surface water collection systems is generally based on a different model referred to as the Rational Method, which tends to give much higher runoff peak flow rates than the FSR models. The Rational Method was applied to the proposed facility to estimate the peak discharge rates from the site for the most intense annual storm, as provided by Met Éireann (6.3mm in 15 minutes for Mullingar). This gave a peak annual discharge of 137l/s. This discharge represents approximately 4.5% of the mean annual peak flow in the stream.

While the annual peak discharge from the development may not represent a large increase in the context of the peak stream flow, more intense storms with longer return periods can be expected during the life of the facility. Higher discharge rates associated with these heavier storms may result in flooding. The surface water run-off from the site will be controlled to restrict flows from the site, thereby reducing the risk of flooding in areas downstream of the site.

This will be achieved by flow balancing, where the discharge flow rate will be restricted by installing a fixed control such as an orifice or vortex flow regulator or by throttling the discharge through a pipe of a specified diameter. These controls will be designed to prevent discharges in excess of the defined peak discharge flow rate, which is proposed to be the pre-development mean annual peak flow of 109l/s.

The surface water discharge will comprise roof water and runoff from non-process hardstanding areas of the facility that has passed through the silt trap and oil/water separator. Flows in excess of peak flow rate will be diverted to a soakaway area between the site and the stream.

The soakaway will provide storage for excess flows and will enable the water to slowly infiltrate through the base of the soakaway to the groundwater table, which provides base flow to the stream in the north. This operation will delay large quantities of water reaching the stream during peak flow conditions.

The soakaway will be defined by small bunds which will contain the runoff. The bunds will be approximately 0.5m high and will provide sufficient capacity to accommodate excess runoff from the 1 in 20 year 1-day storm event, equivalent to approximately 1000m³. The area will be planted with trees which form a screen around the site. The soakaway will only receive diverted water intermittently, and as such will not have adverse effects on the trees of the area.

10.10.2 Water Quality Impacts

Leachate

Contaminated water and leachate will be contained by the concrete base of the facility and collected by means of a series of leachate collection drains, as illustrated in Figure 4.3. The process areas will be graded away from non-process areas to enhance the efficacy of this system. In addition, small ramps will be used to delineate adjacent process and non-process areas, particularly between the ASPs and the storage areas.

This leachate will be collected by a dedica
process areas, and stored prior to recirc
leachate will be used to maintain optimur
nutrients and micro organisms present in

Not all of the collected leachate will be re
a seasonal basis. Quantities of leachate
contained prior to treatment in a sequenc
Chapter 4. The effluent from the reed b
discharge conditions required by the EPA
of the leachate treatment plant is shown

Cleaning without water, "dry cleaning" will
possible. Where it is necessary to use w
limit contributions to the surface water col

Fuel and Dangerous Substance Storag

The fuel stores will be bunded in accordar
are most likely to arise during loading or
that best practice is used for these operati
capacity is maintained for retaining spills.

It is possible for spills and leaks to reach a
engine oil from cars and site plant and m
likelihood of such leaks. All surface wat
discharging from the site. The silt trap an

All dangerous substances will be stored i
best practice.

Firewater Retention

In the event of a fire, firewater will be colle
on the area in which the firewater arises.
will contain firewater within those areas.

The leachate collection system will convey
held for testing. The results of the tests w
the leachate treatment plant, or whether t

Firewater entering the surface water syst
surface water treatment plant, which will
can be pumped from the system to either

Emergency procedures will be developed
on-site.

WC Facility

A proprietary treatment system and pe
specification and location of the treatn
accordance with the guidelines in the EP/
for Single Houses". The location of the tr

Suspended Solids

Suspended solids will be removed from ru
collected runoff through a silt trap to enab

10.11Predicted Impacts

The proposed development will alter the surface water drainage characteristics of the site. The calculations contained in Appendix 10.1 indicate an increase in the mean annual peak flow from the site. Flows in excess of the pre-development mean annual peak flow will be diverted to a soakaway, thereby precluding any significant impact on the flow rates in the stream.

All surface water collected on site will be treated by a silt trap and oil/water separator prior to discharge to the adjacent water bodies. The proposed mitigation measures will minimise the potential impact of leachate, firewater, accidental spills, domestic effluent and surface runoff on the local surface water environment.

It is anticipated that there will be an insignificant impact following the implementation of all the proposed mitigation measures. The operation of the development in accordance with good management practices and the containment provided by the surface water management system will mitigate significant environmental impacts during normal operation.

Accident and emergency response procedures will be prepared for all identified risks, to further mitigate potential impacts.

10.12Monitoring

Ongoing routine surface water monitoring will be undertaken during the operation of the proposed development. All discharges to the surface water environment will be monitored in accordance with the requirements of the Waste Licence.

The surface water silt traps and oil/water separators will be inspected and cleaned on a regular basis. Any material removed from the separators will be disposed of in accordance with National Legislation.

Leachate quality over a range of parameters will also be examined. The final effluent from the reedbed will be monitored for parameters in accordance with the Waste Licence.

10.13Restoration and Residual Impacts

It is anticipated that the proposed facility will operate for the foreseeable future and some restoration details are included in Chapter 4. Should the facility close down, it would be decommissioned as described in Chapter 4. The removal of all wastes, products, fuels and other materials suggests that the source of any risk associated with the site would be removed. Surface water would continue to be monitored until such time that monitoring is not required, as agreed with the EPA.

10.14Conclusion

The design of the facility and best environmental management practices will ensure that the potential impacts of the proposed facility on the surface water environment during operations will not be significant. Should the site be decommissioned and restored, the subsequent impacts on the surface water environment will be insignificant.

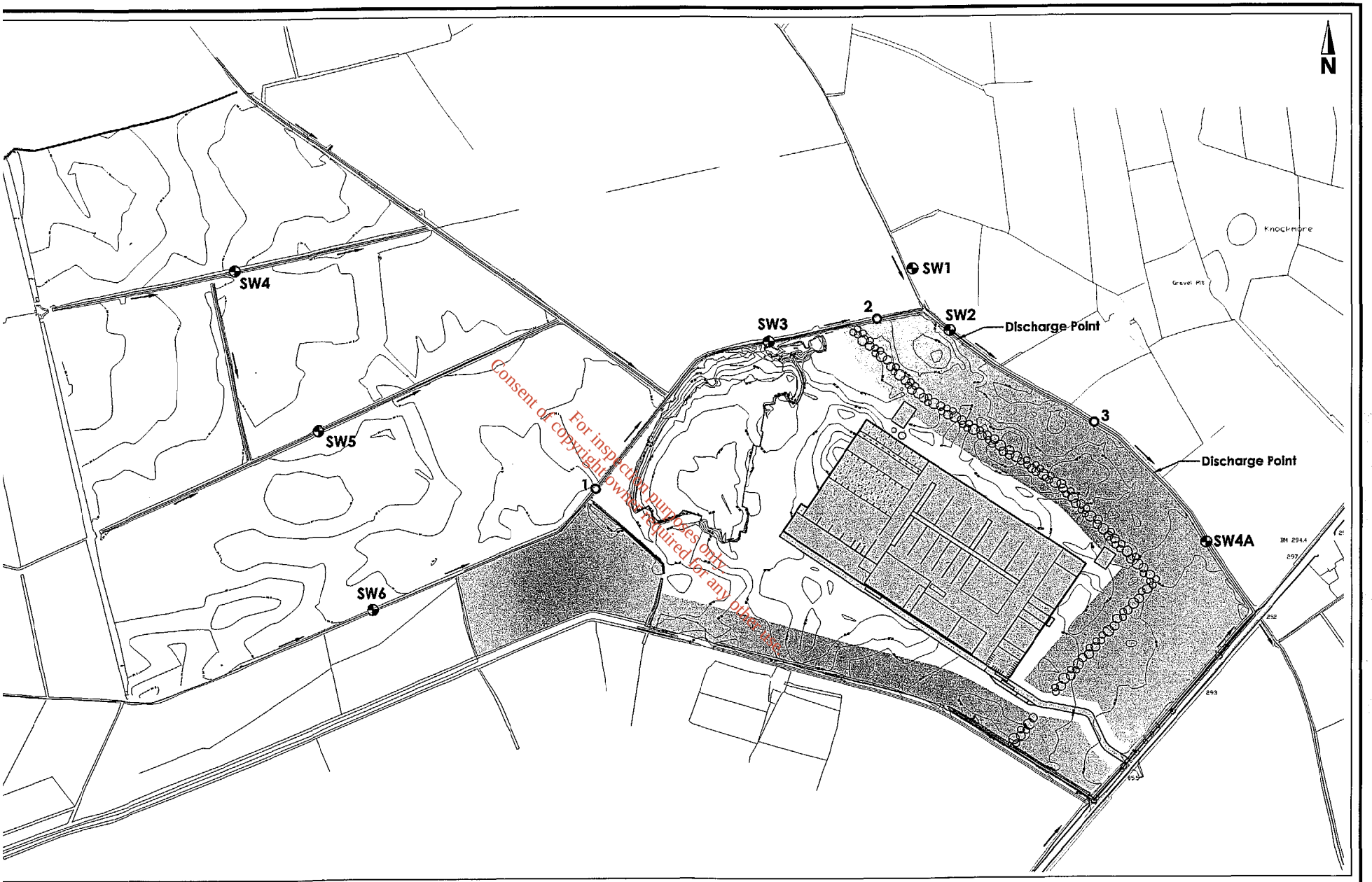

FIGURE 10.1
SURFACE WATER AND MONITORING POINTS