

**APPLICATION SITE REPORT  
FOR PPC APPLICATION**

**Chelson Meadow Leachate Treatment Plant**

**Plymouth City Council**

**September 2006**

## **Contents**

### **Summary**

#### **1.0 Introduction**

##### **1.1. Site Location**

##### **1.2. Details of Installation**

#### **2.0 Objectives**

#### **3.0 Site Setting and Sources of Desk Study Research Information**

##### **3.1. Introduction**

##### **3.2. Environmental Consents, Licences, Authorisations, Permits and Designations for the Site and Surrounding Area**

##### **3.3. Geological and Hydrogeological Data**

##### **3.4. Site Operational Records, Emergency Response Records and Records of any Land Pollution Incidents in the Vicinity of the Site**

##### **3.5. Existing Site Investigation and Assessment Reports**

##### **3.6. Other Information**

#### **4.0 Site Reconnaissance**

##### **4.1. Introduction**

##### **4.2. Storage Tanks and Associated Pipe Work**

##### **4.3. Concrete Hardstanding and Bunds**

##### **4.4. Vegetation**

##### **4.5. Surface Water Features**

##### **4.6. Nature of the Storage and Handling of Materials**

##### **4.7. Surface Water and Foul Drainage**

##### **4.8. Other Indicators**

#### **5.0 Assessment of Land Pollution Potential**

##### **5.1. Polluting Substances and Relevant Activities**

##### **5.2. Preventative Measures**

##### **5.3. Assessment of the Likelihood of Land Pollution**

#### **6.0 Conceptual Site Model**

##### **6.1. Geology and Hydrogeology**

##### **6.2. Surface Water Features**

##### **6.3. Results of Previous Investigations/Assessments**

##### **6.4. Other Receptors**

##### **6.5. Land Pollution History**

##### **6.6. Site Zoning**

##### **6.7. Summary of Conceptual Site Model**

###### **6.7.1. Introduction**

###### **6.7.2. Graphical Representation of the Site**

###### **6.7.3. Uncertainties in the CSM**

## **References**

### **Appendix A - Figures and Maps**

- A1 Site Location Plans
- A2 Geological Maps and Cross Sections
- A3 Site Layout Plans
- A4 Plans Showing the Location of Sensitive Receptors
- A5 Plans Showing Surface Finishes
- A6 Plans Showing Zones

### **Appendix B - Site Reconnaissance**

- B1 Photographs

### **Appendix C - Desk Study Information**

- C1 Environmental Consents, Licences, Authorisations and Permits for Site and Surrounding Area
- C2 Geological and Hydrogeological Data
- C3 Hydrological Data
- C4 Site Operational Records, Records of any Land Pollution on Site
- C5 Existing Site Investigation, Assessment and Remediation Records

### **Appendix D - Data Assessment**

- D1 Assessment of Land Pollution Potential

### **Appendix E - Conceptual Site Model**

- E1 Graphical

### **Appendix F - Leachate Management Plan**

**Summary**

This document represents the Site Report for Chelson Meadow Leachate Treatment Plant submitted as part of an application to the Environment Agency (Application No. CP3731LZ) for a permit to operate an installation under Regulation 10 of the Pollution Prevention and Control (England and Wales) Regulations 2000.

Records of the site and surrounding areas have been reviewed along with operational site records in order to describe the condition of the site and, in particular, to identify any substance in, on or under the land that may constitute a pollution risk to the land. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken.

## 1.0 Introduction

Leppitt Associates has been commissioned by Plymouth City Council to undertake an assessment of Chelson Meadow Leachate Treatment Plant Installation (LTPI) for the purpose of performing a desk top study of its environmental setting and land pollution history, and a conceptual site model as part of the Pollution Prevention Control Permit application submitted in July 2006.

### 1.1. Site Location

The installation is located at  
Chelson Meadow Leachate Treatment Plant  
Chelson Meadow Landfill  
The Ride  
Plymstock  
Plymouth  
PL9 7JA

The centre of the site is at National Grid Reference SX 50581 54466. The site covers an area of 0.4 Ha and can be seen in Drawing No. WD/W1/472 of Appendix A1.

The LTPI is situated immediately adjacent to the east bank of the River Plym (Drawing No WD/W1/473, Appendix A1) east of the city of Plymouth and south of the A38 trunk road. It was constructed on previous waste deposits as is most of the infrastructure at Chelson Meadow Landfill. The western boundary of the LTPI is formed by the Ride while the north western boundary is defined by the haul road into the Chelson Meadow Landfill waste facility. The glass bays and bulky waste reception area are located on the eastern boundary of the LTPI. The southern boundary is defined by the Chelson Meadow Landfill leachate storage lagoon and a glass skip storage area. The entire LTPI boundary is enclosed by a chain link fence with three sets of lockable gates.

The proposed installation is regulated at present by the Environment Agency (EA) as part of a larger waste management facility that includes: landfill with associated leachate collection and storage facility; Household Waste Recycling Centre, Municipal Recycling Facility; and Green Waste Composting area.

### 1.2. Details of Installation

The LTPI receives landfill leachate from Chelson Meadow Landfill leachate storage lagoon only, arising as a result of waste degradation within the landfill and the percolation of precipitation through the waste. Leachate is a generic term given to water that has come into contact with landfilled waste materials, and in doing so has dissolved contaminants from them (PPC Technical Guidance 2006). Further details describing the chemical constituents of leachate can be found in Appendix F1.

The focus for treatment is aerobic biological treatment within sequential batch reactors (SBRs). An SBR is a cyclically operated, suspended growth, activated sludge process, which carries out functions such as aerobic biological treatment, equalisation, settlement of solids, effluent clarification and decanting, over a time sequence rather than in spatially separate tanks as would occur in conventional activated sludge systems, such as those operated in a water treatment plant. The operating cycle comprises four main phases: fill, react, settle, decant. Once aerobic biological treatment is complete, effluent is discharged direct to the River Plym during high tide via an outfall pipe.

In order to comply with future permit conditions the LTPI will be modified according to the Improvement Plan provided in Folder 2, Section 3, of the Permit application.

## **2.0 Objectives**

The objectives of this report are:

To satisfy the requirements of the PPC Regulations at time of permitting by:

- ◆ Identifying the environmental setting and land pollution history of the site;
- ◆ Identifying activities that will be conducted at the installation that may lead to land pollution;
- ◆ Identifying and assess the preventative measures that are in place to protect the land; and
- ◆ Assessing whether there is:
  1. little likelihood that land pollution or leaks to land will occur during the future life of the installation;or there is:
  2. a reasonable possibility that there is potential for current or future land pollution of the land from the installation.

### **3.0 Site Setting and Sources of Desk Study Information**

#### **3.1. Introduction**

The following sections detail the sources of desk study information searched in order to describe the condition of the installation and, in particular, to determine the potential for substances to be present in, on or under the land associated with present and past uses of the site and its surrounding areas.

#### **3.2 Environmental Consents, Licences, Authorisations, Permits and Designations for the Site and Surrounding Area**

The Sitescope Environmental Database was used to provide records of any Discharge Consents, Waste Management Licences, Abstraction Licences, IPC Authorisations, PPC Permits and Land Drainage Consents for the site and within 1000 metres of the site boundary. The results are shown in Appendix C1.

There are no Trade Effluent Consents for the site.

English Nature and Plymouth County Council were requested to provide details of any Nature Conservation Designations for the site and within 2 kilometres of the site boundary and 5km European sites for Nature Conservation importance. The locations of Designated Sites within the vicinity of the site are shown in Appendix A4.

#### **3.3 Geological, Hydrogeological and Hydrological Data**

Geological and hydrogeological information for the site was obtained from the following sources and is reproduced in Appendix C2, and a geological map is included in Appendix A2.

BGS Sheet 340 & 349 1 to 50000 Scale map  
Environment Agency Groundwater Vulnerability Map Sheet 49  
Borehole Archive Data within the installation boundary, which is presented in Appendix C5.

A summary of the site hydrology has been taken from the Hydrogeological Risk Assessment for Chelson Meadow Landfill submitted as part of the IPPC Landfill Permit application in 2003 and is provided in Appendix C3. The location of water courses within 250m of the installation are shown on Drawing No. WD/W1/473, Appendix A1

#### **3.4 Site Operational Records, Emergency Response Records and Records of any Land Pollution Incidents in the Vicinity of the Site**

Operational records from the site have been reviewed and are summarised in Appendix C4. These data illustrate the quality of leachate entering the installation and effluent being discharged after treatment. These data are the sole source of data regarding potentially polluting substances arising from the operation of the installation. A chronology of the modifications to the installation to ensure compliance of effluent with a discharge consent has been produced. This does not relate to any incidents involving the loss of containment or the release of potentially polluting substances to land because the sole regulation on the installation is the volume of effluent released to the River. No effluent is released to land and no accidental release of effluent or untreated leachate has occurred other than that to the outfall pipe.

There have been no pollution incidents within the installation boundary but the installation is operated on top of former landfill and within the site boundary of an existing landfill, both of which have associated leachate. Beyond the installation boundary but within the landfill site boundary there is a single incident of pollution arising from the release of leachate into the Northern Leat from the

## Chelson Meadow Leachate Treatment Plant - Site Report

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northern sector of the adjacent landfill in the early 1990s. Historically, the Southern Leat was polluted from lateral seepage of leachate until the southern cut off wall was completed in 2005. The landfill boundary is now encircled by peripheral engineered barriers and diffuse pollution to surface water has been controlled.

Site operational layout plans, including the location and nature of underground services and pipelines are shown on Drawing No. WD/W1/475 in Appendix A3.

The location of bulk storage tanks is shown on Drawing No. WD/W1/472 in Appendix A1.

Site drainage plans are included in Drawing No. WD/W1/472 in Appendix A1, which indicates that no foul drains are associated with the installation. There are two underground pipes serving the installation: one receives leachate from the pumping station and feeds the LTP; the second receives treated effluent and leads to the outfall. There is surface water drainage within the concrete hard standing surrounding the LTP, which enters the landfill leachate storage lagoon.

### **3.5 Existing Site Investigation and Assessment Reports**

Prior to the construction of the pumping station and LTP trial pits and boreholes were undertaken. A summary of these investigations is provided in Appendix C5. Further details are covered under Section 6.1 of this document.

### **3.6 Other Information**

Not applicable.



**4.0 Site Reconnaissance**

**4.1. Introduction**

The site reconnaissance was undertaken on numerous occasions during the fourteen months between July 2005 and September 2006 by Leppitt Associates on the area shown in Drawing No. WD/W1/472, Appendix A1.

The purpose of the reconnaissance was to inspect the site and surrounding area for indicators of potential land pollution. Site infrastructure was visually to assess its competence and potential to cause or have caused releases to land.

The SBRs and surrounding surface infrastructure were inspected and any indicators of potential sources of land pollution investigated. None were evident above ground. Photographs of the SBRs and other relevant infrastructure are included in Appendix B1 and Appendix F.

**4.2 Storage Tanks and Associated Pipe Work**

The LTPI is comprised of:

Description	Contents	Volume	Location	Integrity/Testing	Other Observations
SBR 1	Leachate/Effluent	700m <sup>3</sup>	Above Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> <li>• Annual Engineering</li> </ul>	Currently good condition
SBR 2	Leachate/Effluent	700m <sup>3</sup>	Above Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> <li>• Annual Engineering</li> </ul>	Currently good condition
SBR 3	Leachate/Effluent	700m <sup>3</sup>	Above Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> <li>• Annual Engineering</li> </ul>	Currently good condition
SBR 4	Leachate/Effluent	700m <sup>3</sup>	Above Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> <li>• Annual Engineering</li> </ul>	Currently good condition
Rising Main to LTP	Leachate	350mm diameter	Below Ground	<ul style="list-style-type: none"> <li>• Annual CCTV</li> </ul>	Currently good condition
Effluent Return Line from LTP	Effluent	350mm diameter	Below Ground	<ul style="list-style-type: none"> <li>• Annual CCTV</li> </ul>	Currently good condition
Pump Lifting Station wet well	Leachate	20m <sup>3</sup>	Below Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> </ul>	Currently good condition
Discharge Channel	Leachate/Effluent	N/A	Above & Below Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> </ul>	Currently good condition
Outfall Pipe	Leachate/Effluent	N/A	Above Ground	<ul style="list-style-type: none"> <li>• Visual Monthly</li> </ul>	Currently good condition

The locations of the above are shown Drawing No. WD/W1/472 in Appendix A1. Construction details can be found in the Appendices to Appendix F.

There is no secondary or tertiary containment for any the above.

#### **4.3 Hardstanding and Bunds**

Drawing No. WD/W1/476 in Appendix A5 shows the various surface finishes within the LTPI, which are also illustrated by Plates in Appendix B1. The SBRs are surrounded by reinforced concrete, laid in slabs and with sealed joints. There is a gas proof membrane below the SBRs, the concrete service road and the control building. All engineered surfaces are inspected visually on a monthly basis and none have significant areas of cracking or other damage.

There are road gullies within the service road and these drain into the adjacent landfill leachate storage lagoon as shown on Drawing No. WD/W1/475 in Appendix A3.

#### **4.4 Vegetation**

Vegetation within the LTPI is concentrated on the north western boundary and provides screening against the site haul road for the adjacent landfill. The vegetation is comprised of a mosaic of shrubs and neutral grassland of medium diversity. The shrubs include hazel and hawthorn, which have been planted, and non-native Butterfly Bush which has invaded. Other than planted shrubs the vegetation has developed naturally on and adjacent to low bunds constructed of sub-soil. There is very little bare ground and the vegetation is lush and apparently healthy with no signs of die-back. Growth is sufficiently vigorous to require annual strimming. There are no plant species indicative of extreme edaphic conditions, e.g. sea plantain, thrift and buckshorn plantain etc.

#### **4.5 Surface Water Features**

Not applicable.

#### **4.6 Nature of the Storage and Handling of Materials**

On-site materials:

Anti-foaming silicone is contained within 25l drums located within the pump lifting station. When required these are moved to the top of the SBR. These are not stored within a bunded area but the contents are inert and pose no environmental hazard. A bunded store located close to the SBR is to be constructed in the future as part of the Improvement Plan (Folder 2, Section 3 of the Permit application).

Off-site materials:

A tanker may visit the LTPI on an annual basis to re-seed the SBRs if required. This tanker is parked on the concrete between the SBRs and control room. It contains activated sewage sludge from a municipal sewage works, which has the potential to pollute if spilt in an uncontrolled area. The concrete areas are served by gullies all of which feed the adjacent landfill leachate storage lagoon.

#### **4.7 Surface Water and Foul Drainage**

There is no foul drainage, soakaways or interceptors located within the LTPI. Surface run-off is channelled by gullies to the adjacent landfill leachate storage lagoon as mentioned above.

#### **4.8 Other Observations**

Not applicable.

**5.0 Assessment of Land Pollution Potential**

**5.1. Polluting Substances and Relevant Activities**

A list of all substances used, stored, generated by the treatment process is shown below. An assessment of their pollution potential has been made based upon their properties, toxicity and volume stored, used or manufactured. Those substances thus identified have been taken forward to 5.2 below.

Substance	Volume	Toxicity	Fate	Pollution potential
Landfill leachate	Maximum SBR cycle intake of 1320m <sup>3</sup>	Variety of List 2 and a small number of List 1 substances	Zones 1 & 2	High
Effluent	Maximum SBR output of 1320m <sup>3</sup>	Low provided treatment has occurred	Zones 1, 2 & 3	Low
Bacterial biomass/mixed liquor	Maximum SBR storage of 1320m <sup>3</sup>	Low provided treatment has occurred	Zone 1	Low
Inorganic sediment	Maximum of 40m <sup>3</sup>	Unknown	Contained within SBR	Unknown
Anti-foam	250l	Nil	Zones 1 & 2	Low
Lubrication oil	25l	List 1 hydrocarbons	Zone 1	High

**Zone 1:**

Landfill leachate storage lagoon, served by gullies in concrete hardstanding surrounding SBRs. Substances contained therein.

**Zone 2:**

Loss to groundwater from damaged below-ground pipes between SBRs and pump lifting station, contained within landfill site boundary by peripheral engineered barriers.

**Zone 3:**

Loss to groundwater and surface water beyond peripheral engineered barriers from damaged channel, excluding normal discharge point.

**5.2. Preventative Measures**

The pollution preventative measures (physical infrastructure and those relating to testing, inspection and maintenance) for each relevant activity associated with the potentially polluting substances have been identified and their extent and condition assessed. The results of this work are shown in Appendix D1.

Plans showing the location of these activities are shown in Appendix A1 and A6.

**5.3. Assessment of the Likelihood of Land Pollution**

Appendix D1 contains an assessment of the likelihood of land pollution from the installation.

## Chelson Meadow Leachate Treatment Plant - Site Report

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For all relevant activities at the installation there is little likelihood that land pollution or leaks to the land will occur during the future life of the installation. It is the conclusion of this report that reference data for the site does not need to be collected.

## 6.0 Conceptual Site Model

### 6.1. Geology and Hydrogeology

A detailed account of the geology and hydrogeology of the entire waste management facility was prepared in 2003 (Pell Frishmann 2003) in support of the PPC Landfill Permit Application. The summary provided has been synthesised from this and borehole logs commissioned as part of the initial ground work investigations prior to the construction of the Pump Lifting Station and the Leachate Treatment Plant. Appendix A2 shows the geology of the locality taken from the British Geological Survey maps for Plymouth and Ivybridge, and a more detailed assessment submitted by Pell Frishmann (2003) based on borehole log data. Borehole logs relating to the installation are located in Appendix C5 and indicate that the underlying geology of the LTPI contains the following materials:

1. Made Ground (upper stratum across the entire LTPI)
2. Alluvium (lowest stratum for much of the LTPI)
3. Upper Devonian Slate (beneath Leachate Treatment Plant)
4. Middle Devonian Limestone (around Pump Lifting Station)

Alluvium deposited in the original Chelson Bay estuary area underlies much of the waste management facility although its depth varies depending on the location of the bed rock and the depth of the overlying Made Ground. The lithology of the Alluvium changes close to the LTPI to include a coarser fringing deposit on the edge of the former estuary area. These transition materials can be divided into three zones:

- Typical Alluvium zone: silts and clays in excess of 3m thickness (as below the majority of the site)
- Transition zone: angular gravels interbedded with silts
- Peripheral gravel zone: angular gravels with minor sand and silt

The peripheral gravel zone material is typically described on logs from the LTPI as "grey angular and sub angular coarse slate, limestone and calcite gravel with cobbles". It is probably a blend of weathered bedrock and locally reworked estuary perimeter sediment. The transition zone soils are the interbedded silts and gravels, with the granular soil layers typically forming about half of the overall thickness. This zoned pattern of estuary perimeter drift deposits is evidently present at least as far the eastern boundary of the LTPI.

The boreholes taken from around the Leachate Pumping Station area (see Appendix 2) encountered the upper surface of the drift deposits at variable elevation (range -0.15 to -3.0m AOD). The base of the drift deposits also deepens northwards in this area, from around -2.0 to -7.0m AOD close to the southern boundary of the LTPI. Accordingly, the actual thickness of the drift deposits at any location within the southern part of the LTPI is quite variable, ranging from around 1.0 to 6.5m.

In the south-western area of the site, exploratory hole records confirm the geological map evidence that a boundary between Upper Devonian Slate and Middle Devonian Limestone exists. Boreholes in the south-western part of the site show that the position of the geological contact between the limestone series (to the south) and the slate (to the north) roughly follows the southern boundary of the LTPI. Boreholes in the centre of the LTPI encounter consistent purple and grey slate, whilst boreholes to the west, south and east encounter interbedded grey slate and limestone. The limestones are commonly impure and cleaved, although some thicker beds of more pure fine grained limestone do exist. The limestone beds are interbedded with grey calcareous slates. In some cases the beds of slate reach quite considerable thickness and in some boreholes (especially where the depth of drilling into bedrock is short) it can become difficult to be clear as to whether such strata are correctly ascribed to the Middle Devonian.

The Groundwater Vulnerability Map of South Devon, Sheet 49, classifies both the Alluvium and the Upper Devonian Slate as Minor Aquifer (variably permeable) comprising 'fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits', and which may be important for local supplies. Overlying soils are classified as having "intermediate leaching potential (I1)", and "can possibly transmit a wide range of pollutants". The Middle Devonian Limestone (Plymouth Limestone Formation), in keeping with Palaeozoic carbonates present elsewhere in the south-west of England, does not allow any large-scale intergranular flow. Groundwater movement is normally confined to solution features and solution-widened discontinuities where its movement is dependent on fracture spacing, aperture and degree of interconnection. The limestone formation is classified on the Groundwater Vulnerability Map as a Major Aquifer (High Permeability) with a soil vulnerability classification of I1. In urban areas its classification rises to HU, a worst-case vulnerability classification until proven otherwise (although it is likely that I1 will still apply). Groundwater flows within the basal limestone formation strata (limestone interbedded with slate) are also likely to be controlled by fractures/discontinuities.

## 6.2. Surface Water Features

The surface water features in the vicinity of the site are shown on Drawing No. WD/W1/473 of Appendix A1 and are as follows:

River Plym estuary, located west of the LTPI, flowing north to south. Mudflats are exposed at low tide and effluent is released into the River on an outgoing high tide.

The South Leat lies to the south of the LTPI on the far side of the peripheral engineered barrier. Water drains from east to west into the River Plym. The watercourse is now classified as an RE1 to RE2. The only hydrological link between the LTPI and the South Leat would be via loss of effluent from the discharge channel.

Surface water drainage for the site is shown on Drawing No. WD/W1/472 of Appendix A1.

Groundwater beneath the site is not in hydraulic continuity with either surface water feature because of the construction of the peripheral engineered barrier, which encircles the entire landfill site boundary. The only break in this barrier is where the discharge channel rises above it. The groundwater within the installation boundary is linked to the landfill leachate storage lagoon only.

## 6.3. Results of Previous Investigations/Assessments

*Appendix C5 contains borehole logs from initial site investigations during preparation for the construction of installation infrastructure.*

## 6.4. Other Receptors

The Plymouth Sound and Estuaries Special Area of Conservation lies within 5km of the installation. A full Habitat Risk Assessment is supplied with the application, see Folder 2, Section 7.

## **6.5. Land Pollution History**

The entire installation was constructed on former landfill, which commenced in 1965. This is confirmed by the borehole logs and trial pits, which show the underlying geology to be made ground Appendix C5. The groundwater beneath the site is contaminated with leachate because of the hydraulic continuity with an unlined landfill operating under the principal of dilute and disperse.

## **6.6. Site Zoning**

The site has been divided into a series of zones based upon the site setting and the possible location of potentially polluting substances. These zones are shown in Appendix A6. The following describes these Zones.

### **Zone 1:**

Landfill leachate storage lagoon, served by gullies in concrete hardstanding surrounding SBRs. Substances contained therein.

### **Zone 2:**

Loss to groundwater from damaged below-ground pipes between SBRs and pump lifting station, contained within landfill site boundary by peripheral engineered barriers.

### **Zone 3:**

Loss to groundwater and surface water beyond peripheral engineered barriers from damaged channel, excluding normal discharge point.

## **6.7. Summary Conceptual Site Model (CSM)**

### **6.7.1. Introduction**

The findings of the desk study and site reconnaissance (detailed above) have been used to develop the conceptual site model (CSM) for the site. Uncertainties in the CSM are identified and their significance discussed.

### **6.7.2. Graphical Representation of the CSM**

Graphical representations of the CSM have been produced and are shown in Appendix E1.

### **6.7.3. Uncertainties in the CSM**

In developing the conceptual model for the site the following assumptions have been made:

- All losses to surface drainage migrate to the adjacent landfill leachate storage lagoon via gullies in engineered surfaces. This assumption has low significance since losses that disperse to groundwater will be contained according to assumption 2 below.
- All losses to groundwater in Zone 2 are contained by the peripheral engineered barrier serving the landfill site boundary. This is a significant assumption but there is strong evidence from monitoring of the adjacent landfill that the assumption is valid.
- All losses to ground or surface water in Zone 3 will ultimately be lost to the River Plym as if discharged through the outfall pipe, which lies within 10m of the point where the channel crosses the peripheral engineered barrier; groundwater boreholes in the vicinity have water tables that fluctuate according to tidal status, whereas groundwater boreholes surrounding the LTPI show no

Chelson Meadow Leachate Treatment Plant - Site Report

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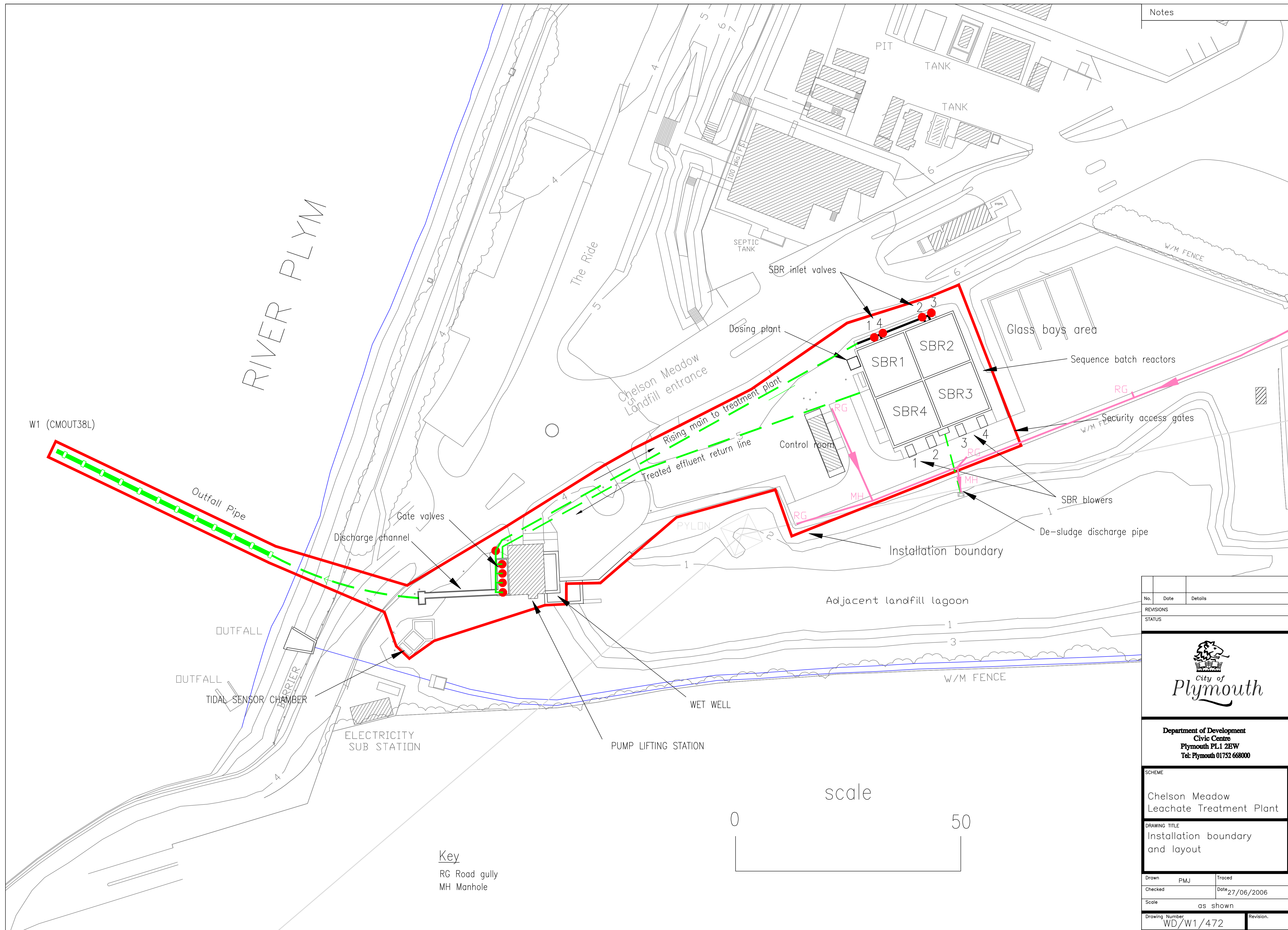
such influence. This assumption is of low significance because all substances released via the outfall pipe are, at present, discharged legally under an existing discharge consent.



**SITE REPORT**  
**Appendix A**

**A1**

Notes



W1 (CMOUT38L)

RIVER PLYM

The Ride

Chelson Meadow Landfill entrance

PIT

TANK

TANK

SEPTIC TANK

SBR inlet valves

Dosing plant

Glass bays area

Sequence batch reactors

Security access gates

Control room

SBR blowers

De-sludge discharge pipe

Installation boundary

Adjacent landfill lagoon

PYLON

W/M FENCE

WET WELL

PUMP LIFTING STATION

ELECTRICITY SUB STATION

TIDAL SENSOR CHAMBER

OUTFALL

OUTFALL

BARRIER

Discharge channel

Gate valves

Outfall Pipe

scale



Key  
 RG Road gully  
 MH Manhole

No.	Date	Details
REVISIONS		
STATUS		



Department of Development  
 Civic Centre  
 Plymouth PL1 2EW  
 Tel: Plymouth 01752 668000

SCHEME  
 Chelson Meadow Leachate Treatment Plant

DRAWING TITLE  
 Installation boundary and layout

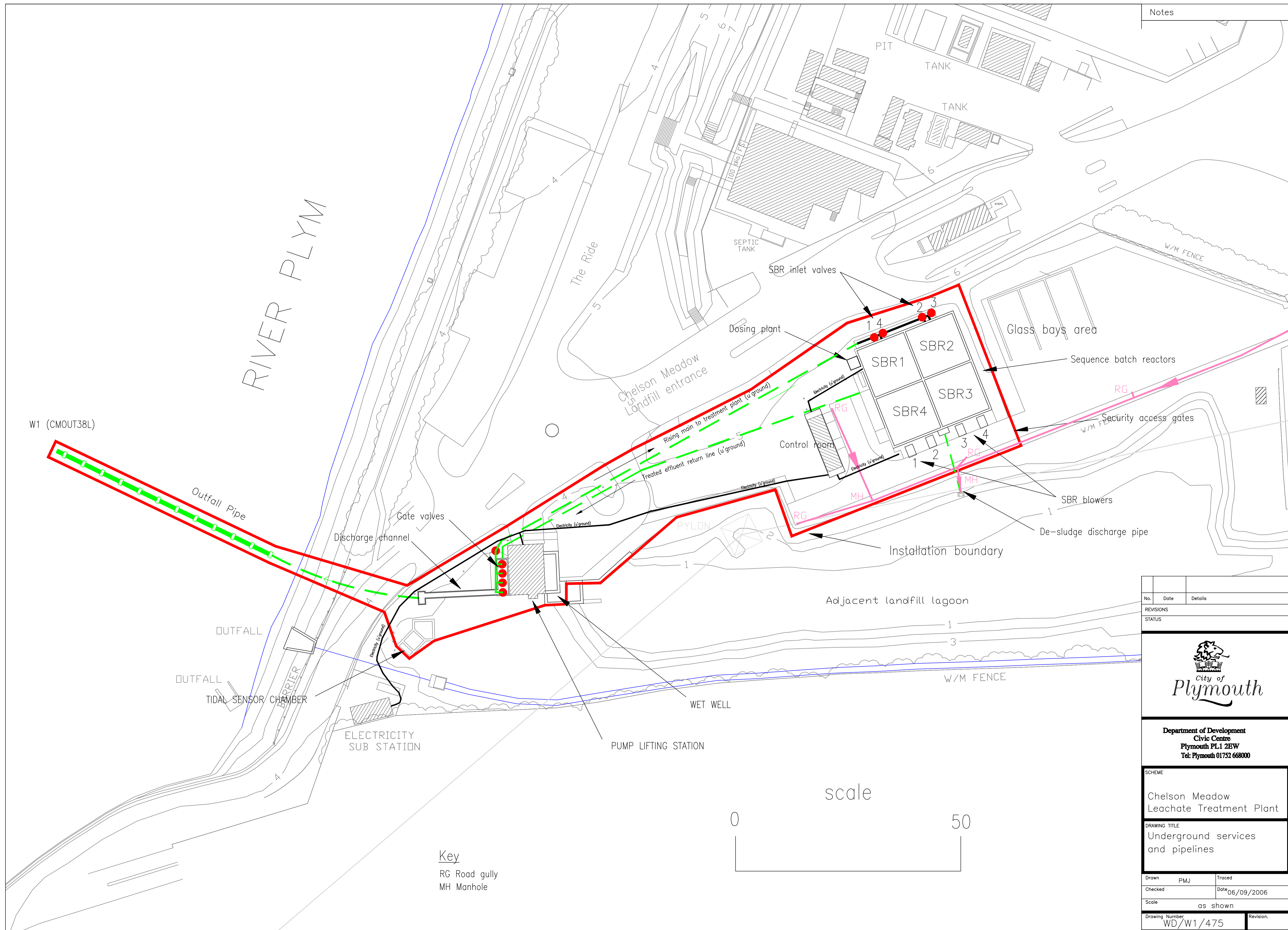
Drawn	PMJ	Traced
Checked		Date 27/06/2006
Scale as shown		
Drawing Number	WD/W1/472	Revision.







Notes



W1 (CMOUT38L)

RIVER PLYM

The Ride

Chelson Meadow Landfill entrance

PIT TANK

TANK

SEPTIC TANK

SBR inlet valves

Dosing plant

SBR1

SBR2

SBR3

SBR4

Control room

Glass bays area

Sequence batch reactors

Security access gates

SBR blowers

De-sludge discharge pipe

Installation boundary

Adjacent landfill lagoon

PYLON

WET WELL

W/M FENCE

ELECTRICITY SUB STATION

PUMP LIFTING STATION

TIDAL SENSOR CHAMBER

OUTFALL

OUTFALL

Outfall Pipe

Discharge channel

Gate valves

Key  
 RG Road gully  
 MH Manhole



No.	Date	Details
REVISIONS		
STATUS		



Department of Development  
 Civic Centre  
 Plymouth PL1 2EW  
 Tel: Plymouth 01752 668000

SCHEME  
 Chelson Meadow  
 Leachate Treatment Plant

DRAWING TITLE  
 Underground services  
 and pipelines

Drawn	PMJ	Traced
Checked		Date 06/09/2006
Scale as shown		
Drawing Number	WD/W1/475	Revision.









**SITE REPORT**  
**Appendix B**

**SITE REPORT**  
**Appendix C**

**C1**





**C4**

C5



**SITE REPORT**  
**Appendix D**

**SITE REPORT**  
**Appendix E**

**SITE REPORT**  
**Appendix F**