

Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Standard Landfill Site

Flintshire County Council Waste Management Services

Replacement of Groundwater Monitoring Borehole GW2

Construction Quality Assurance Plan

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STANDARD LANDFILL SITE

REPLACEMENT OF GROUNDWATER MONITORING BOREHOLE GW2

CQA PLAN

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2596-CAU-XX-XX-DR-C-300	Cross Section through Monitoring Borehole

1.0 BACKGROUND

1.1 Introduction

1.1.1 Caulmert Ltd (Caulmert) has produced this document on behalf of Flintshire County Council Waste Management Services (FCC), which covers the installation of a groundwater monitoring borehole to replace GW2 at Standard Landfill Site.

1.1.2 The aim of this document is to provide a Plan and Specification detailing the installation and the Construction Quality Assurance (CQA) procedures that will be followed for the installation of the groundwater monitoring borehole. Any changes to this CQA Plan will be notified to the NRW in writing.

1.2 Site Location and Surrounding Land-use

1.2.1 Standard Landfill Site is located approximately 1 km north-east of Buckley town centre, Flintshire, North Wales (NGR SJ 290 650) and is shown in Figure 1 below. The site is accessed via the B5127 (Liverpool Road).

1.2.2 The site is bounded to the east by Burntwood Road where several residential properties have boundaries within 50 m of the eastern extreme of the site. To the west of the site lies agricultural land, separated from the landfill boundary by a water course. The Spencer Industrial Estate, which comprises several small industrial units, is situated beyond the southern site boundary. The A55 dual carriageway runs adjacent to the northern boundary.

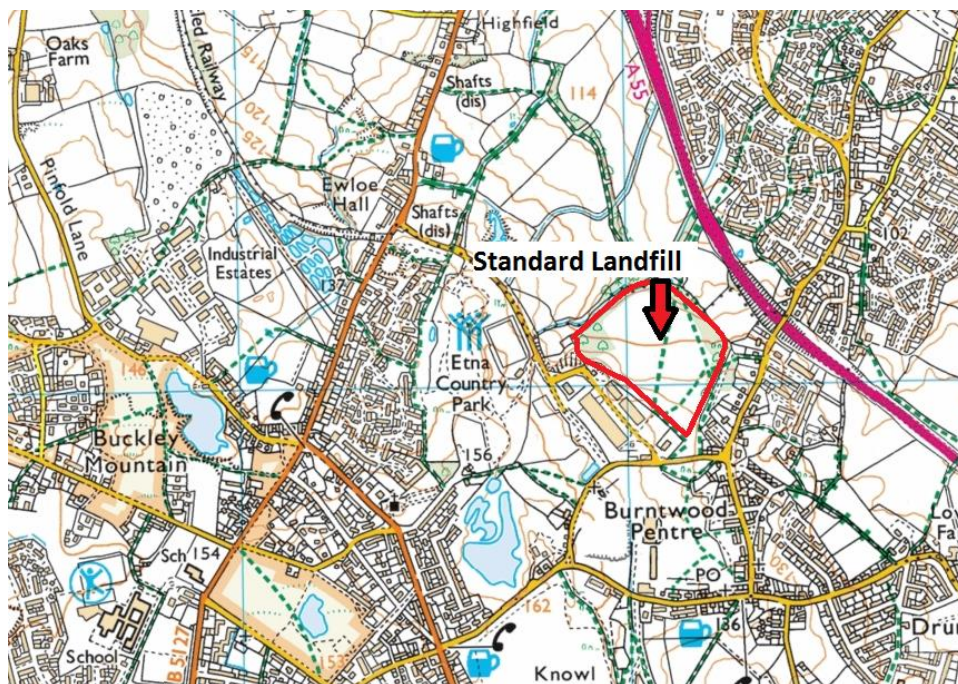


Figure 1: Site Location

- 1.2.3 A Site of Special Scientific Interest (SSSI), namely The Buckley Claypits and Commons, is located close to the Site. Standard Landfill is also surrounded by the Deeside and Buckley Newt Site Special Area of Conservation.

1.3 Environmental Context

Geology

- 1.3.1 The underlying geology of the site consists of a superficial deposit of Devensian Till, with underlying bedrock of Pennine Middle Coal Measures. This bedrock consists of sequences of grey mudstone with sandstone bands, interbedded with coal. The coal bands are between 0.2 m and 1.5 m thick, while the mudstone / sandstone bands can be up to 26 m thick in places, but are more commonly found with thicknesses in the order of 10 m.
- 1.3.2 Bands of pure mudstone are also present at the site, indicating a heterogeneous nature to the mudstone/sandstone lithology. Shales are also noted as occurring in conjunction with the coal bands. In a few instances, bands of black mudstone are found at depths greater than 100 mAOD.

Hydrology

- 1.3.3 The site is enclosed by streams to the west and north. There are several large bodies of surface water at the site. There is a pond situated approximately 500 m west of the site, in agricultural fields and there is also a large lake 500m south of the site.

Hydrogeology

- 1.3.4 Groundwater flow at the site is predominantly through silt and mud bands. There is also potential groundwater flows at the site through adducts and old workings, present in the underlying coal measures.

2.0 DEFINITIONS

2.1 Abbreviations and their definitions

‘approved’	means approved in writing.
‘CQA’	Construction Quality Assurance is an auditing process comprising a planned and systematic assessment of all means and actions designed to provide adequate confidence that items provided or services delivered meet specified contractual and regulatory requirements, and will perform satisfactorily in service. In the context of this document Construction Quality Assurance refers to the means and actions of the Supervisor, to provide adequate confidence that the borehole installation process, conforms to this CQA plan, the Contract, Drawings and Specification. CQA is provided by a party independent from those parties carrying out installation and operational works.
‘record’	writing/drawing in an approved format as evidence of work carried out.
‘Specification’	that part of the Contract entered into between the Employer and the Contractor which sets out the Employer’s detailed requirements as to how the works should be constructed, tested, measured and quality assured.
‘NRW’	Natural Resources Wales
‘verify’	confirm orally or in writing that an action has been performed in accordance with the Specification and/or the CQA Plan.
‘Works’	the permanent works as shown on the contract drawings.

2.2 Parties Involved

2.2.1 There are three parties involved in the works outlined in this document, these are:

The Employer

2.2.2 The Employer means the person or persons, firm or company or other body who own and have responsibility for the facility. For the works undertaken at Standard, the Employer is FCC. The Employer will enter into a contract with a Contractor for the execution of the works detailed in the CQA Plan, Specification and Contract Drawings. The Employer will act as the Engineer for the works and may be represented on site by personal representatives or other parties, e.g. the CQA Consultant.

The Contractor

2.2.3 The Contractor means the person or persons, firm or company or other body to whom the Contract will be awarded by the Employer, and includes the Contractor’s personal representatives or other parties, e.g. Sub-contractors, Manufacturer. The Contractor will

undertake the execution of the Works under the terms of the Contract.

The CQA Consultant

2.2.4 This is the Company independently appointed to confirm the work carried out by the Contractor is in accordance with the CQA plan. The company shall appoint a CQA Project Manager and a CQA Site Engineer, as detailed below:

- ***CQA Project Manager (CQA PM)***

The CQA PM shall be based at the office of the CQA Consultant and shall oversee site CQA works and liaise closely with the CQA Site Engineer. The CQA PM will be responsible for the preparation of the CQA plan and CQA validation report together with attending CQA meetings, if deemed necessary.

- ***CQA Site Engineer (CQA SE)***

The CQA SE will be a representative of the CQA Consultant appointed to oversee the works on a full time basis and shall liaise closely with the NRW, the Employer and the Contractor, and verify that the Works are constructed in accordance with the CQA Plan. The CQA SE will be responsible for undertaking the supervision of the works together with keeping record of:

- Specification of materials used in the works;
- Assessing manufacturer's test data to confirm that the materials used in the works meet the required specification;
- Logging the boreholes during the Works;
- Photographic records of the Works;
- Supervision of remedial works in the event of borehole relocation;
- Preparation of CQA validation report, and
- Liaison with the NRW on the progress and quality of the works as they proceed in conjunction with the Employer.

3.0 GENERAL REQUIREMENTS AND INFORMATION

3.1 British Standards and References

- 3.1.1 The drilling and installation of the monitoring borehole shall be undertaken in accordance with the "Specification for Ground Investigation" published by Thomas Telford Services Ltd and the Environment Agency 'Groundwater Protection: Principles and practice (GP3)'¹.

3.2 Method Statements and Risk Assessments

- 3.2.1 A Contractor shall submit method statements and risk assessments for the approval of the CQA Consultant prior to commencement of the works, detailing their proposals for all the works to be undertaken.

3.3 Access Routes

- 3.3.1 The Contractor shall only use the access routes approved by the Employer in conjunction with the CQA Consultant.
- 3.3.2 All fences or other barriers breached or otherwise disturbed during site operations shall be immediately repaired or replaced to the same standard as prior to their disturbance.

3.4 Care in Executing the Work

- 3.4.1 All work shall be carried out with the least possible damage to the site, the existing on-site installations and the environs of the site. Any damage shall be reported to the Employer and CQA SE immediately and repaired or replaced to the same standard as prior to the damage and to the satisfaction of the Employer and CQA SE.

3.5 Working Areas

- 3.5.1 All Works delivered through this CQA Plan shall be confined to the minimum area of ground required for the works, and shall in any event take place within an area previously agreed with the Engineer. Upon completion all surplus material and rubbish will be cleared away and removed from the site so that it is left in a clean and tidy condition.

3.6 Setting Out

- 3.6.1 Setting out data for the borehole location and depth will be provided to the Contractor by the CQA Consultant prior to commencing the work. The replacement borehole will be installed 5 m away from the existing GW2, taking into account any ground services on site and the accessibility of the installation in the future. An indicative borehole location is shown on drawing 2596.CAU.XX.XX.DR.V.1800. The borehole location will be agreed with the Engineer in conjunction with the CQA Consultant. The intention is to construct the

¹ Environment Agency (August 2013, Version 1.1) 'Groundwater Protection: Principles and practice (GP3)'.

monitoring borehole at depth to terminate in the underlying Pennine Middle Coal Measures, to ensure that the objectives of the groundwater monitoring are achieved.

- 3.6.2 The Contractor will be expected to liaise with the Employers land surveyor and CQA SE in regard to all setting out and construction level control, and shall be to National Grid co-ordinates and levels.

3.7 Unexpected Conditions

- 3.7.1 Where anomalous or unexpected conditions are revealed the Contractor shall inform the Engineer immediately in conjunction with the CQA SE.

3.8 Surface Water

- 3.8.1 Surface water ingress shall be prevented from entering the borehole from the ground surface level during the period of construction.

3.9 Accreditation of Drillers

- 3.9.1 All drillers employed for the provision of the Works shall hold a current, relevant certificate of competence for rotary drilling as issued by the British Drilling Association or an equivalent organisation.

3.10 Drilling Records

- 3.10.1 The Contractor shall keep a written record while constructing a borehole. The Daily Drilling records shall record the following information:

- Borehole reference number;
- Depth of borehole at the end of each working day;
- Plant in use;
- Diameters and depths of casing used;
- Depths to each change of stratum;
- Records of groundwater;
- Brief description of each stratum;
- Brief description of any visible or olfactory indications of contamination;
- Any addition of water to the boring;
- Details of time spent drilling and overcoming any obstruction;
- Details of standpipe installation;
- Details of hole stability;
- Details of backfilling and grouting;
- Type of drilling fluid (if used).

- 3.10.2 The CQA Consultant shall produce a detailed borehole log to BS5930:2015 for the installation. The BS5930 compliant borehole log will include the following information:

- Clearly identified changes in all strata;

- All water-strikes and rest levels to be noted;
- Final borehole depths to be confirmed by the Engineer in conjunction with CQA SE prior to installation of well casing;
- Borehole construction details shall also appear on the same log to show the complete picture of the borehole installation.

3.10.3 No samples of the strata or water will be necessary.

3.11 Supervision

3.11.1 A Contractor will be appointed to carry out borehole installation Works. Third party Construction Quality Assurance (CQA) personnel will also be present on site to verify that the Works are constructed in accordance with the CQA Plan.

3.11.2 The CQA SE shall be responsible for logging the borehole and will compile a daily report of construction activities. These daily report sheets will be kept on site during the works and will be incorporated in the CQA Validation Report.

3.12 Monitoring of the Works

3.12.1 The CQA PM shall ensure that all CQA activities undertaken on site are monitored throughout the Works.

3.12.2 Prior to the borehole installation the involved parties should agree on the following:

- The locations and the depth of the installation;
- Confirm the methods for documenting and reporting, the disturbing documents and reports;
- Review the site health and safety issues and discuss compliance procedures;
- Review the Contractor's method statements and risk assessments, and
- Review the time schedule of the construction operations.

3.13 CQA Validation Report

3.13.1 On completion of the borehole installation works a CQA Validation Report will be prepared by the CQA Consultant and forwarded to NRW for approval. The report will form a permanent record that the Works were constructed in accordance with the CQA Plan and Specification. As a minimum the report will include the following:

- A summary of the works undertaken;
- The materials and construction methods employed;
- Changes from design and material specifications, and
- Any other observations the CQA Consultant regards as pertinent to demonstrate that the works have been undertaken in accordance with this CQA Plan.

3.13.2 This will be supported with the following data:

- Any additional site-specific data, i.e. Drillers Daily Logs;
- A drawing showing the borehole location;
- The CQA SE's site records i.e. Daily Report sheets and Borehole Log to BS5930, and;
- Photographs of the Works.

4.0 DRILLING AND INSTALLATION OF MONITORING BOREHOLE

- 4.0.1 The borehole shall be constructed using an appropriate drilling method to a minimum nominal diameter of 200 mm. The borehole shall be constructed vertically and maintained within 5 degrees of the vertical throughout their entire length. The Contractor will drill through the superficial till deposits, until the underlying Pennine Middle Coal Measures is reached.
- 4.0.2 The Contractor shall ensure that any spoil produced in the drilling of the borehole is disposed of upon completion of each drilling operation to the active landfill area.
- 4.0.3 If the Contractor fails to complete the borehole as specified, the borehole shall be abandoned and a new borehole constructed at an approved position agreed with the CQA SE. Abandoned boreholes shall be backfilled to the satisfaction of the CQA SE with spoil generated from the drilling procedure and a bentonite cap. The integrity of the surrounding ground will be restored.
- 4.0.4 If the borehole has not been completed by the end of each working shift, the open hole shall be made safe, secured and covered. At the beginning of the next shift, prior to any drilling being undertaken, the cover will be removed and the borehole monitored for the presence of landfill gas.
- 4.0.5 Upon completion of the borehole to the approval of the CQA SE, it shall be dipped prior to the installation of the well liner and the depth recorded relative to the ground level adjacent to the hole.
- 4.0.6 The borehole will be backfilled only after the well liner installation has been completed to the satisfaction of the CQA SE.
- 4.0.7 The monitoring borehole shall be constructed of a 100 mm nominal diameter, High Density Polyethylene (HDPE) solid and slotted pipe, the relative length of sections will depend on the ground conditions and groundwater level encountered. Solid pipe will be installed from ground level to 1 m below ground level (mBGL), the solid pipe will extended to 0.5 m above ground level (mAGL). The screened section (slotted pipe) shall be installed from 1 mBGL to the base of the borehole. These screened sections of the well casing shall have holes no greater than 5 mm in diameter at intervals of approximately 75 mm or an equivalent area of slots with a width no greater than 5 mm. The groundwater borehole detail is shown in drawing 2596-CAU-XX-XX-DR-C-300.

- 4.0.8 All well casing shall be equipped with a screw fit end cap on the bottom and associated geowrap and filter pack. The filter shall be comprised of 6 – 10 mm washed granular fill. The filter pack will be installed from the base of the borehole to 100 mm above the top of the slotted pipe section. The Contractor shall ensure that “bridging” of the fill between the well casing and the borehole does not occur, i.e. no voids shall be left in the borehole and the placement of the fill does not affect the alignment and/or integrity of the well casing.
- 4.0.9 A bentonite seal will extend from ground level to 100 mm above the slotted pipe section, to prevent surface water entering the borehole annulus. A layer of bentonite shall be placed to form a dry layer on top of the gravel pack. The well annulus shall then be gradually filled with pre-mixed fully hydrated bentonite powder; the CQA Engineer shall record the number of bags of bentonite used during the installation of the seals.
- 4.0.10 On completion, the borehole shall have a lockable steel cover installed and referenced.



DRAWINGS

2596.CAU.XX.XX.DR.V.1800
2596-CAU-XX-XX-DR-C-300

Proposed Borehole Location
Cross Section through Monitoring Borehole

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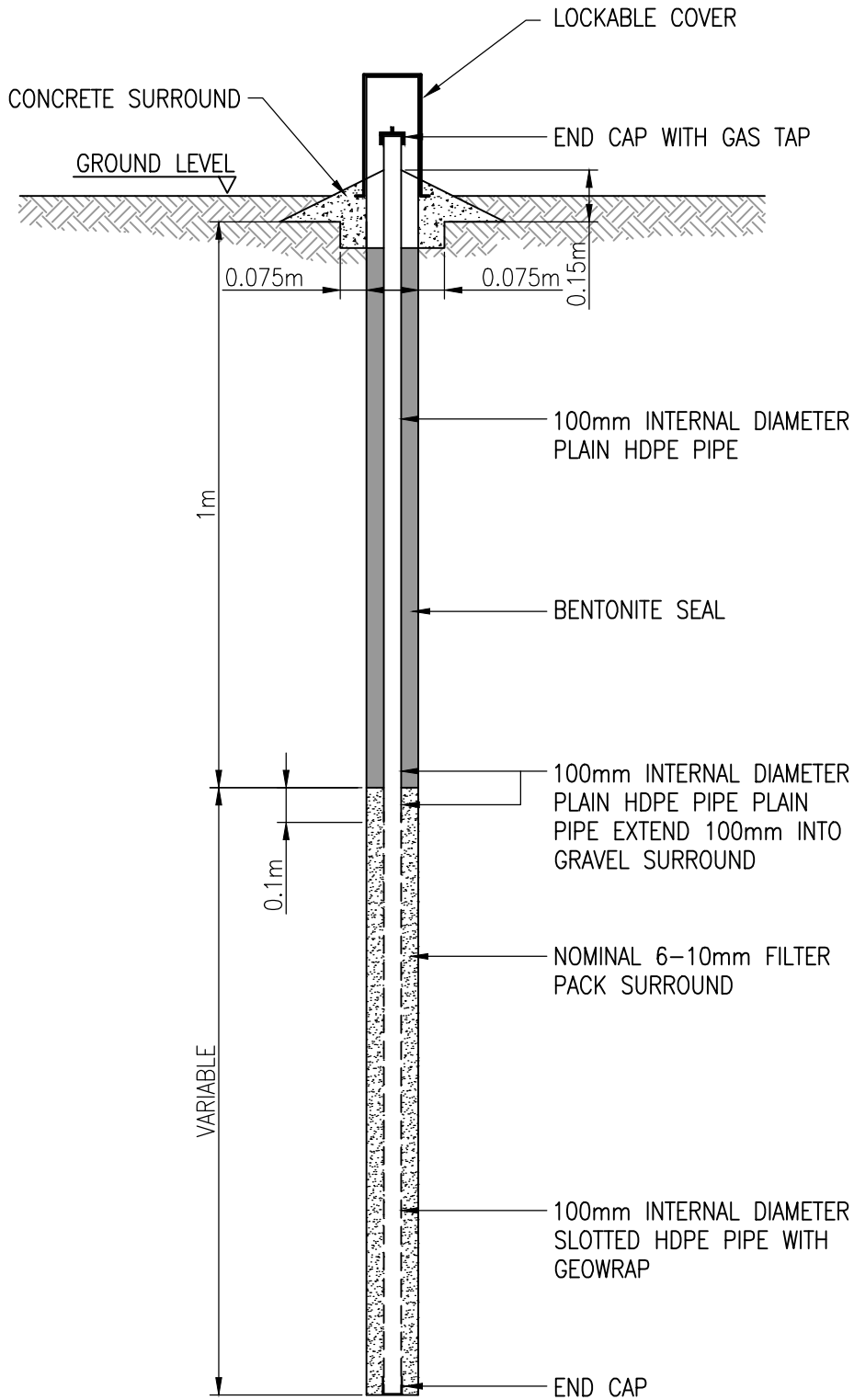
NOTE

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2. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING WILL BE ALLOWED WITHOUT THE PRIOR PERMISSION IN WRITING.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.
4. GW2 LOCATION TO BE REPLACED TO THE NEW PROPOSED GW2 LOCATION SHOWN ON DRAWING

**PRELIMINARY DRAWING
FOR INFORMATION
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REV	MODIFICATIONS	BY	CH	AP	DATE
FLINTSHIRE COUNTY COUNCIL					
PROJECT: INSTALLATION OF REPLACEMENT MONITORING BOREHOLES					
TITLE: CQA PLAN GW2					
DRAWN BY		DATE			
CF		DD.MM.YYYY			
REVIEWED BY		SCALE @ A3	JOB REF:		
SO		1:XX	2596		
AUTHORISED BY		ISSUE	REVISION		
JM		-	-		
DRAWING NUMBER					
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STANDARD
LANDFILL

GROUNDWATER
MONITORING
INSTALLATION DETAIL



DRAWN BY
EW

CHECKED BY
GB

APPROVED BY
LS

DATE
06.07.2016

SCALE @ A4
N.T.S.

DRAWING NUMBER
2596.CAU.XX.XX.DR.C.300

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