10  GROUND CONDITIONS AND CONTAMINATION

10.1 SUMMARY OF RESIDUAL IMPACTS

Implementation of the mitigation measures identified in this Chapter will ensure that there will be no significant impacts of an adverse nature relating to ground conditions as a result of the development and after-use of the proposed power plant.

The combination of the validation works and the development proposal will actually provide an opportunity for delivering beneficial impacts, by fully mitigating legacy issues such as site contamination.

10.2 INTRODUCTION

This chapter assesses the likely impact of the proposed power plant in relation to ground conditions and potential contamination.

The BP Chemical Ltd (BPCL) Baglan Bay facility as a whole has experienced industrial activity such as the manufacture of olefins and related alcohols, aromatics and polymers for over forty years. These activities have influenced the ground profile over time and also had some effect on the physical and chemical nature of the superficial soils.

Within the subject site, previous operations including a Chlorine Plant, Power Station, Olefins Plant and Alcohols Plant have been identified. From a review of previous studies conducted for the subject site and surrounding areas, the most relevant issues identified were related to issues of potential ground contamination.

10.3 ASSESSMENT SCOPE AND METHODOLOGY

10.3.1 Spatial Extent of the Assessment

The spatial extent of the area considered in this Chapter includes the main development and temporary laydown and construction areas, covering approximately 10.5 hectares. Figure 2.2 shows the extent of the area assessed.

10.3.2 Assessment Scope

The scoping report for this project was provided to NPTCBC and the statutory consultees in May 2007. The suggested scope of impact assessment work, with regards to ground conditions and potentially contaminated land, was to review the studies that have been undertaken for the site to assess the status of the area. These studies were reviewed in light of the proposed development scheme, with an assessment of the likely environmental risks.
10.3.3 Assessment Methodology

The assessment methodology that has been used in this chapter comprises five principal tasks, namely:

- review of salient information sources and relevant policy and legislation;
- definition of the baseline ground conditions that exist for the site;
- assessment on the scale and significance of temporary, permanent, or cumulative impacts relevant through construction and after-use;
- definition of measures, where practicable and appropriate, to avoid, mitigate or compensate for any predicted significant impacts, or maximise the potential for positive impacts occurring as a result of the project; and
- identification of the scale and nature of residual impacts.

10.4 Legislation and Policy Review

10.4.1 General Policy on Contaminated Land

Planning Policy Wales 2002 provides the basis for land contamination and development in Wales.

The planning policies adopted by NPTCBC and contained in the Unitary Development Plan define the currently imposed controls where land is known or suspected of being potentially contaminated. The aim of these policies is to ensure that the development of contaminated land is ‘suitable for use’ and that the physical constraints on the land are taken into account at all stages of the planning process.

The present system requires any developer to provide the Planning Authority with sufficient information on the proposed site to assess its potential for contamination and to ensure that remedial activities are sufficient to protect end users and the environment.

The over-arching policy of the Authority is to control development and land use through planning policy. Part IIA of the Environmental Protection Act 1990 is, however, closely related and interconnected. The collation of site-specific information within the development of the Strategy aids the planning process, particularly with regard to derelict and brownfield sites. Part IIA also provides a mechanism for checking that remedial activities carried out during development has been to a sufficient standard.
10.4.2 Building Control

The Building Regulations 1991 require that contaminated land issues be taken into account early during the construction phase. Unlike Part IIA controls however, the Building Regulations 1991 only considers the effects of contamination where it comes into direct contact with the building materials themselves as opposed to the whole development site.

10.4.3 Integrated Pollution Control (IPC) and Integrated Pollution Prevention & Control (IPPC)

The Environmental Protection Act 1990, Part I is the legislative tool to control polluting processes to all media. With the advent of the new IPPC legislation that came into force in 1999, the Government has introduced additional controls which require that new and existing process operators must be responsible for the conditions of the land both during and following the closure of the process. The framework for the site assessment is in principle based on the identification and consideration of a potential contamination source, pathway and receptor. In this respect, the information collected through IPPC applications adds to the database of information concerning the condition of land within the Borough. Within the development footprint there are no processes or operations controlled under IPC or IPPC. Prior to the CCGT power plant becoming active (ie electricity generation), the operation will require a PPC license.

10.4.4 Health and Safety

Health and safety issues are controlled by both the Health and Safety Executive (HSE) and the Local Authority, as defined in regulations made under the Health and Safety at Work Act 1974. Remediation and reclamation operations involving the ‘handling’ of contaminants require that the relevant safety standards and guidelines be followed.

10.4.5 Statutory Nuisance

Until the introduction of Part IIA legislation, the statutory provisions of Part III of the Environmental Protection Act 1990 were the traditional means of achieving remediation of any risk of pollution arising on premises. This legislation has now been amended to provide that no land in a ‘contaminated state’ can now be defined as a statutory nuisance. Both the implementation of the contaminated land inspection strategy and the investigation of statutory nuisance issues are to be conducted by Environmental Health Officers of the Environment and Development Department so permitting the coordination of information gathering.
10.4.6 Evaluation Criteria

With regard to contaminated land and the existing reclamation strategy, potential effects of contamination have been assessed in accordance with current UK government approach and best practice (termed CLEA Guidance). The approach adopted in assessing the actual impact of contamination within this chapter is also consistent with this approach.

The general approach to assessing the significance of residual effects is to use the following criteria:

- **Non Significant** – slight, very short or highly localised impact of no significant consequence;

- **Significant** – limited impact (by extent, duration or magnitude), which may nonetheless be considered significant in the context of the site and/or surrounding area; and

- **Particular Significance** – considerable impact (by extent, duration or magnitude), of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

10.5 Baseline Conditions

10.5.1 Sources of Information

Existing site specific investigations within the development footprint are limited to the investigation, remediation and validation of the former chlorine plant located in the western section of the development footprint.

10.5.2 Site History

The BP Chemical Ltd (BPCL) Baglan Bay facility has experienced industrial activity since its development in 1961. The facility was established upon approximately two metres of steelwork slag overlying Aeolian and marine sands with operations undertaken including the manufacture of olefins and related alcohols, aromatics and polymers. These operations have influenced the ground conditions at the facility over time and also had an effect on the physical and chemical nature of the superficial soils.

Within the development footprint, operations including a Chlorine Plant, Power Station, Olefins Plant and Alcohols Plant have been identified. Ground contamination resulting from these operations has been identified and remediated. Historical uses of the site are shown in Figure 10.1.
Historical Uses of Site

- Red Line Boundary
- Alcohols Plant
- Former Chlorine Plant
- Former Olefins Plant
- Power Station

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PROJECTION: British National Grid
10.5.3 **Geology and Hydrogeology**

Published British Geological Survey (BGS) mapping indicate that the general area of the site is underlain by aeolian sands. A review of the surrounding geology indicates that marine beach deposits, marine alluvium and glacial drift underlie the aeolian sands. Carboniferous aged Lower Coal Measures, comprising siltstones, mudstones and coal measures, are indicated beneath the drift deposits.

Previously conducted site investigations within the development footprint (former Chlorine Plant) reported the following geologic sequence:

- 0 – 2mbgl to 10 - 13mbgl – dense, fine Aeolian and/or Marine Sand;
- 10 - 13mbgl – a discontinuous Alluvial Clay layer (0.3-1.0m thick);
- 10 – 13mbgl to 25 – 27mbgl – Alluvial Deposits comprising silty sands; and

The alluvial deposits and underlying Boulder Clay are classified as minor aquifers of local importance. Groundwater has been identified to flow generally to the north towards the Neath Estuary, and is present at 2.4 to 2.6 mbgl.

10.5.4 **Madeground**

Review of previous site investigations indicate that underlying the site is a layer of imported steelworks slag. This blanket of madeground has been identified extending up to 2.0m in depth. As part of recent remedial and validation works within the former chlorine plant, it was reported that much of this layer has been exported off-site to an appropriately licensed landfill.

10.5.5 **Soil Contamination**

A range of land uses within the site have been identified during the previous investigation, including:

- chlorine plant;
- olefins plant;
- power station; and
- alcohol plant.

Additionally, the presence of imported steelwork waste material such as ash, slag and clinker presents a potential source of contamination.

10.5.6 **Remediation Process**

The remediation process for the development footprint will be completed in line with CLR11, Model Procedures for the Management of Land Contamination prior to the construction phase of the power plant. The
remediation plan will incorporate a desk based study of the development footprint, including a review of available historic maps. From this, a detailed site investigation and quantitative risk assessment will be completed, with an outline conceptual site model produced for the site. The information obtained from the desk top study and site investigation will allow a remediation and validation programme to be designed and implemented resulting in ground conditions suitable for commercial/industrial land use.

A similar remediation process has been undertaken for the former chlorine plant located within the western section of the development footprint. These works are discussed in the following sections.

10.5.7 Summary of Contamination Results

Site investigations have been undertaken within the former chlorine plant area of the development footprint.

Following these investigative works, a Stage 3 Assessment, using a CLEA based model, concluded that appropriate remedial target for mercury at the site was 50mg/kg, with a target soil leachate concentration of 0.23mg/l for the protection of controlled waters. These more stringent remedial targets were adopted during the remediation works, instead of the CLEA SGV of 480mg/kg.

As part of BP’s Environmental Improvement Programme to address liabilities associated with groundwater and human health, a remediation strategy for the site was implemented. The strategy was consistent with UK guidance and legislation, particularly Part II A of the Environmental Protection Act 1990. It was proposed to carry out large scale excavations of mercury contaminated material and have a specialist waste carrier transport it to an appropriately licensed landfill.

Risk assessments undertaken as part of health and safety management indicated that the site could pose a potential risk to human health from mercury vapour migration and inhalation. In order to address these potential risks, vapour monitoring was undertaken for the duration of the remedial works and appropriate RPE provided to site workers as an additional precaution. Monitoring results indicate that at no time during the works was a potential risk posed to site workers, persons on the boundary of BP Chemicals, or personnel or visitors to the adjacent GE Power Station.

It has been concluded that following the excavation and disposal of all contaminated material and validation of works, it is considered that the site will no longer present an on-going risk to human health via ingestion, dermal contact or inhalation of dust and vapours in a commercial industrial end use scenario.
10.6 Potential Impacts

10.6.1 Key Development Activities

The following key stages of development will take place during construction of the CCGT:

- levelling and compaction of the site and the formation of surface water drainage system;
- installation of foundations;
- excavation and construction of sub-surface structures (basements);
- above ground construction works;
- service connection (including trenching); and
- establishment of site infrastructure (roads, car parking) and landscaping.

10.6.2 Ground Contamination

Introduction

The remediation/validation works to be conducted for the development footprint will produce a final soil condition that does not unduly constrain any eventual permitted land use. Any residual unacceptable risk to public health or controlled waters will be ruled out, because:

- any localised areas with minor exceedances will neither be widespread nor significant in the context of the risk assessment thresholds developed for the site; and

- there will also be a requirement as part of development to provide remediation and validation of the site in accordance with the wider requirements of TAN9 ‘Planning Pollution, Control and Waste Management’ and the overall UK policy objective of safeguarding human health and the environment.

Permanent Impacts

On the basis of the above, it is considered that permanent impacts in relation to contamination will be non significant, as the contamination legacy of the site will have been dealt with permanently. This status will be dependant on the proposed remediation works being suitably validated.

Temporary Impacts

Temporary impacts might occur from residual impacted soil, produced as a result of activities associated with foundations, services and road construction. Such impacts are however considered to be minor in scale, and therefore considered non significant as the most significant contamination will have been treated as part of the remediation/validation. Mitigation measures (see section below) that will be incorporated as part of the construction programme are discussed below.
10.7 **Cumulative Impacts**

As all issues relating to ground conditions and contamination are confined within the scheme footprint, with no significant requirement for off site disposal of soils during development, there is considered to be no significant potential for cumulative impacts.

10.8 **Mitigation and Monitoring**

10.8.1 **Permanent Mitigation**

There will be a requirement to complete remediation and validation works for the site as part of the construction process and to discharge any associated planning conditions via submission of relevant reports to the planning authorities.

Once this has been achieved, any specific detailed design proposals for development will address the existing ground conditions in light of specific layout details. Supplementary ground investigations will be carried out to provide detail on specific issues. This applies to the entire proposed development footprint.

10.8.2 **Construction Mitigation**

A Code of Construction Practice (CoCP) will be developed for the scheme. The CoCP will be adhered to by the Contractor and it is anticipated that this will be enforced through conditions on the Section 36 consent. Some of the core elements of the CoCP in relation to ground conditions will be as follows:

- Full compliance with CDM and other Health and Safety legislation will apply throughout any works on site (including any pre-development works).

- If contamination that has not been previously identified is encountered on site, measures will be put in place to provide suitable mitigation. This may include additional site investigation, regulatory dialogue and remediation measures.

- Spoil arising from the works which is classed as “acceptable fill” shall wherever practicable be used in construction works (dependant upon compliance with existing waste management legislation).

- The water environment will be protected through the management of earthworks and materials arising, particularly in areas of potential contamination.

- In the unlikely event of impacted material being encountered, the Safety Officer shall ensure that a Workers’ Safety Information Sheet is
prominently displayed in rest/mess rooms and wash rooms covering hygiene, work practices, clothing requirements etc.

- A Waste Management Plan will be developed in accordance with Site Waste Management Plans: Guidance for Contractors and Clients (DTI, 2004) and in consultation with the Environment Agency Wales and the local authority. The plan will identify:
  
  o responsibilities for waste management;
  o the waste category and quantities of materials generated;
  o measures to minimise waste generation;
  o opportunities for recycling and/or re-use;
  o proposed treatment and disposal routes; and
  o licensing requirements.

- The plan will include an audit programme to be undertaken to demonstrate compliance with statutory requirements.

- The disposal of waste, including any surplus spoil, will be managed so far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal.

- Provision will be made for a suitable environmental specialist to identify any “special waste” as defined in the Special Waste Regulations 1996 No 972 so that it can be suitably managed and disposed of during works.

- Appropriate precautions will be taken if materials containing asbestos are encountered. The contractor will observe the exposure limits and measurement methods for asbestos, set out in HSE Guidance Note EH 10 1988 and will comply with HSE Guideline Note MS13 Asbestos 1988, the Health and Safety Commission Approved Code of Practice and Guidance Note Work with Asbestos Insulation and Asbestos Coating 1983 in so far as these are applicable to the construction works.

- The construction site will be made safe at night and measures will implemented to prevent trapping or injury to wildlife, such as sealing off or providing means of escape from holes or trenches in excess of one metre in depth.

With these measures in place all identified temporary adverse impacts in relation to ground conditions will be mitigated.

10.9 SUMMARY OF RESIDUAL IMPACTS

Implementation of the mitigation measures identified above will ensure that there will be no significant impacts of an adverse nature relating to ground
conditions as a result of the development and after-use of the proposed power plant.

In fact the combination of the validation works and the development proposal will provide an opportunity for delivering beneficial impacts, by fully mitigating legacy issues such as potential site contamination.

A summary of the residual impacts, monitoring and mitigation is provided in *Table 10.1*. 
Table 10.1  Ground Conditions and Contaminated Land Mitigation and Monitoring

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Impact</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Conditions and Contaminated Land</td>
<td>Impacts from historic ground contamination</td>
<td>Supplementary investigations and risk assessments for the site</td>
<td>No significant residual impacts predicted</td>
<td>Planning conditions for this application and development briefs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriate design of additional remediation measures</td>
<td>No significant residual impacts predicted</td>
<td>Planning conditions for this application and development briefs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Validation of current site area (including remediation)</td>
<td>No significant residual impacts predicted</td>
<td>Existing planning conditions for the reclamation works. CoCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enforcement of safe, best practice working procedures during construction</td>
<td>No significant residual impacts predicted</td>
<td></td>
</tr>
</tbody>
</table>