Christchurch City Council

Tonkin+Taylor

Kyle Park, Hornby Summary Report – Geotechnical + Ground Contamination Assessment

Introduction and objectives

The purpose of the Tonkin & Taylor Ltd (T+T) investigation of Klye Park was to assist the Council's site selection process for the development of a community hub, library and swimming pool in the south-west part of the city. Specifically, the investigation sought to identify potential ground contamination and geotechnical development challanges for this site, compared with others in this part of the city. The investigation also formed the basis for considering various potential development areas within Kyle Park.

This document is an overview of the investigation findings. The full geotechnical and soil contamiantion investigation reports should be read for further information, which are:

- Ground Contamination Assessment, Kyle Park, Hornby - T+T reference 1003207.v2 (November 2018)
- Kyle Park Geotechnical Assessment report - T+T reference 1003207.v2 (November 2018).

Site history

Until the late 1960s Kyle Park was a gravel extraction pit that was purchased by the then Paparua County Council. Paparua County Council then operated the site as a commercial and domestic landfill. Landfilling ceased in the 1980s and the site was then developed as a public park.

1960s Gravel extraction pit.

1980s Public park.

Assessment + Methodology

T+T has undertaken an investigation at the site which included:

- Drilling and logging 20 boreholes to assess how landfill materials varied across Kyle Park
- Testing to assess the physical properties of the materials encountered
- Sampling materials for laboratory testing to assess for the levels of ground contamination.

The site investigation works and laboratory testing were undertaken in accordance with recognised industry practice, including appropriate New Zealand Standards and published Guidelines.

Findings

The types of landfill materials seen during the investigation, their physical condition and the levels of contamination recorded are generally as would be expected for a landfill.

The thickness of landfill materials beneath Kyle Park ranged from 1 to 11 m. These were covered by a cap which varied in thickness up to 1 m. Naturally occurring materials (e.g. alluvial sandy gravels) are present beneath landfill materials. Groundwater was found within the natural material or just within the landfill material.

The landfill materials were variable in composition with depth and laterally between boreholes. Landfill materials recovered during drilling included ash, demolition materials, ceramic, leather, paper, plastic including food packaging, roots, wood and partly decomposed vegetative matter, saw dust, wire and metal. Voids and obstructions were encountered in these materials during borehole drilling. The types of landfill material encountered varied between boreholes and with depth within a borehole. The organic material content of the landfill materials is estimated to be up to 50 % by volume.

The landfill materials are contaminated with the levels and range of contaminants varying laterally and vertically across the site including asbestos materials and fibres.

The geotechnical testing indicated that the landfill materials vary in strength, whilst the natural strata were consistently strong.

Development implications

Remediation/management

In the context of the intended development no ground contamination remediation is necessary. This is because management of contamination can be incorporated into the design earthworks. Suitable measures will need to be implemented during construction works to appropriately manage hazards to workers, future site users and the environment.

The hazards posed by the ground conditions on and beneath the site can be readily managed with well-tried and tested controls and procedures. A key measure will be reducing soil disturbance and handling of the landfill materials, which, amongst other things, can be achieved through specific design of building foundations and site development earthworks.

Earthworks and soil management

The development of the facility on Kyle Park would mean the disturbance of a large volume of contaminated materials, except if development occurs in the north-east corner. The ground surface of this area is approximately 3m lower than the rest of Kyle Park. Therefore, it could be filled to raise up the building floor level. This means that the majority of construction works, if built here, could be undertaken using "clean" material for which no contamination specific health and safety or environmental controls are required.

Offsite disposal of contaminated material not used in development will be costly due to the levels of contaminants recorded, particularly the asbestos content. So reducing their disturbance is preferable, and therefore development in the north-east corner of Kyle Park is considered advantageous to elsewhere at the park.

Foundation design

The nature and variability of the landfill materials makes them unsuitable to support loads from the development. Piling through the landfill materials to transfer loads into the underlying naturally occurring dense materials is a pragmatic option rather than other options requiring the bulk disturbance and/or offsite disposal of landfill materials. This is no different than other similar developments in Christchurch where soft soil layers are unsuitable for supporting loads from similar types of building e.g. the Metro Sports Facility.

Health + Safety

Development of contaminated sites elevates some risks for construction workers and surrounding public compared to an uncontaminated site. However, such risks are manageable and development works on sites with similar types and levels of contamination have been successfully completed elsewhere around Christchurch in recent years. Recent examples include the QEII Recreation Centre and Margaret Mahy Playground. Implementation of robust controls and procedures for construction workers and neighbouring land users (such as the general public using Kyle Park) can be implemented, and would include monitoring to demonstrate their effectiveness.

Environmental discharge

Control of discharges of contaminants during site development can be managed through preparation and implementation of adequate procedures such as dust control and erosion & sediment controls. Detailed evaluation of the potential effects of landfill leachate and/or landfill gas generation and migration from the site are yet to be undertaken. However, from past experience these aspects are expected to be manageable with the appropriate assessment and design of suitable gas protection measures for the development. Such measures have been successfully implemented at Mustang Park within the Christchurch International Airport campus, and the Te Kura Kaupapa Maori o Te Whanau Tahi School in Spreydon.

Consenting

Site development will require a number of ground contamination related resource and building consents/ consent conditions. These will be no different to similar projects recently undertaken around the city (as previously cited) and are not considered to be overly onerous or unusual.

Further investigation

Further information about landfill gas at Kyle Park and presence of leachate will be gathered this year. Information on these is needed for the facility design and to support the building and resource consenting processes. The investigation of both these issues will use a small number of boreholes drilled on site and installed with monitoring pipes that will be monitored regularly during the year.

Conclusions

Investigations have confirmed the previous use of Kyle Park as a landfill site. This presents a number of challenges associated with the proposed development. However, the geotechnical and ground contamination aspects are not dissimilar to other contaminated and/or filled sites recently developed in Christchurch. Measures to manage ground contamination related hazards and the physical properties of the ground beneath the site can be incorporated into the design and construction of building foundations and site earthworks. For design and consenting purposes, more information is needed to assess the potential effects of landfill gas and leachate. These are not expected to be unusual nor present a further impediment.