

Memorandum

To	Belinda Petersen	Page	1
CC			
Subject	Southern Mangere Inlet Options		
From	Central Interceptor Project Team		
File/Ref No.	DRAFT (Update of memo dated 23 April 2013)	Date	1 May 2013

1.1 Background

As requested, we set out as follows a summary of the assessments completed prior to lodgement of the NoR of the various site options considered on the southern side of the Manukau Harbour.

As you are aware, associated with the construction of the proposed Central Interceptor, works are required on the southern side of the Manukau Harbour to provide for:

- A tunnel access shaft to provide access to the tunnel and Tunnel Boring Machine during construction, and to provide access for inspection and maintenance once the tunnel is in use;
- A connection point to divert wastewater from the existing Mangere Bridge Branch sewer to the new Central Interceptor; and
- A pressure relief air vent to safely release air flows during tunnel filling in very large storm events.

1.2 Site options assessment process

In terms of evaluating site options a number of factors have been considered, including:

- *TBM and tunnel access* - a key consideration has been the need during construction to check the TBM and tunnel alignment before the harbour crossing. Once under the harbour, any mechanical problems with the TBM would be extremely difficult to remedy. This risk is reduced by locating the construction site as close as possible to the coastline to enable access to the TBM. Future maintenance access is also required once the tunnel is operational, and minimising the distance for access under this harbour section is also desirable.
- *Managing tunnel pressurisation during filling* - Hydraulic modelling has shown that during tunnel filling in a large storm an air pocket may be created between May Road and the Mangere Pump Station at the Wastewater Treatment Plant (WWTP). This event is expected to occur around twice in five years. This air pocket must be safely vented before tunnel pressurisation and damage occurs and modelling has shown that a shaft is needed between the WWTP and PS23 to provide for pressure relief venting. The analysis shows that the favourable location for this shaft and air vent is in the vicinity of Kiwi Esplanade. The risk of inadequate pressure relief and subsequent damage to the tunnel and associated structures increases as the venting location is shifted closer to the WWTP, ultimately becoming unacceptably high.
- *Length of the tunnel alignment* – as site locations move towards the west tunnel length increases, adding to the construction cost of the project.
- *Construction and operational effects* – considerations have focused on the potential effects of construction on the cultural and geological heritage values of the Ambury Farm Park area, and the local effects on residential neighbours.

1.3 Site locations considered

The site locations considered for the construction site on the southern side of the Manukau harbour are shown on the attached A3 drawing. The site locations considered were:

- Kiwi Esplanade:
 - Proposed location (at existing toilet block near Manukau Yacht and Motor Boat Club); and
 - Kiwi Esplanade West.

- Ambury Park:
 - Ambury Park North;
 - Northern Edge Ambury; and
 - East Ambury.
- Bull Paddock (at western end of Ambury Road);
- Muir Avenue Park;
- Watercare land.

1.4 Summary assessment sheets

A broad summary of this analysis is presented in the August 2012 AEE (Part B Section 9A), and we expand on that work in the summary assessment sheets attached, including site options not specifically identified in the AEE. The summary assessment considers site options generally in relation to the factors described above.

Yours sincerely

Attachments:

A3 drawing of site options and tunnel alignments

Summary sheets for:

- Kiwi Esplanade Site
- Kiwi Esplanade West Site
- Ambury Park North Site
- Northern Edge Ambury Site
- East Ambury Site
- Bull Paddock Site
- Muir Ave Park Site
- Watercare Land Site

MANGERE BRIDGE – OPTIONS



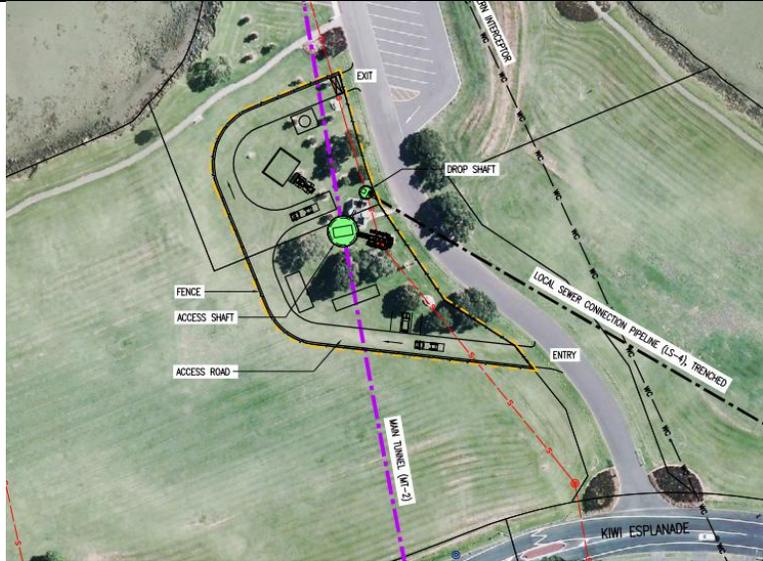
Kiwi Esplanade Site (proposed location)

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,153 m;
- Link Sewer 4 connection to Witla Court: 534m

Construction site location

- Proposed shaft location:
 - minimises distance between tunnel access shafts on either side of the Manukau Harbour
 - allows inspection of TBM before crossing the harbour to ensure it is in good working order
- Construction access via an existing formed road.



Operation and safety

- Pressure relief air vent optimally located to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location minimises distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Open space setting on coastal edge, existing trees provide some screening of permanent works, but construction site fencing and works will be visible to houses on western end of Kiwi Esplanade Reserve
- Neighbours - Reasonable separation from residential neighbours (approx. 100m)
- Recreation - Limited effect on recreation values. Adjacent public walkway. Temporary closure of toilet block.

Cultural & heritage effects

- Cultural heritage - Site in modified area with no archaeological evidence. Site supported by AC Parks
- Geological heritage - No geological heritage sites

Environmental effects

- Air discharge - Reasonable separation from residential neighbours (approx. 100 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events.
- Replacement of existing toilet / changing building provides opportunity to incorporate pressure relief air vent
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads
- Trees - Loss of some existing trees, but will be retained where possible. Replanting & landscaping proposed
- Ecology - Site in proximity to high tide roost used by wading birds. Potential for some limited disturbance during construction. Trenching for Link 4 connection timed to avoid high wader numbers.

Kiwi Esplanade West Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,255 m;
- Link Sewer 4 connection to Witla Court: 670 m

Construction site location

- Proposed shaft location:
 - minimises distance between tunnel access shafts on either side of the Manukau Harbour
 - allows inspection of TBM before crossing the harbour to ensure it is in good working order
- Construction access off Kiwi Esplanade.



Operation and safety

- Pressure relief air vent optimally located to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location minimises distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Open space setting on coastal edge, construction site fencing and works will be highly visible to houses on western end of Kiwi Esplanade Reserve. Permanent works landscaped but remaining in residential views
- Neighbours - Reasonable separation from residential neighbours (approx. 100m)
- Recreation - Limited effect on recreation values. Construction works will conflict with use of adjacent public walkway and require local diversions.

Cultural & heritage effects

- Cultural heritage - Site in modified area with no archaeological evidence. Site supported by AC Parks
- Geological heritage - No geological heritage sites

Environmental effects

- Air discharge - Reasonable separation from residential neighbours (approx. 100 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events.
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads
- Trees – Limited effect. Replanting & landscaping proposed
- Ecology - Site in proximity to high tide roost used by wading birds. Potential for some limited disturbance during construction. Trenching for Link 4 connection timed to avoid high wader numbers.

Ambury Park North Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,313 m;
- Link Sewer 4 connection to Witla Court: 790m

Construction site location

- Proposed shaft location:
 - minimises distance between tunnel access shafts on either side of the Manukau Harbour
 - allows inspection of TBM before crossing the harbour to ensure it is in good working order
- Construction access off end of Kiwi Esplanade into Ambury Farm Park.



Operation and safety

- Pressure relief air vent optimally located to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location minimises distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Greenfields, rural setting on edge of Ambury Farm Park, but largely screened from residential views.
- Neighbours - Reasonable separation from residential neighbours (approx. 100m)
- Recreation - Adjacent public walkway and some potential conflict with public access during construction requiring local diversions and safety management. AC Parks not in favour of sites in Ambury Park.

Cultural & heritage effects

- Cultural heritage - Site identified in Manukau District Plan as Archaeological site & waahi tapu. Site work, including trenching for Link Sewer 4 connection likely to encounter archaeological sites. Iwi in opposition to construction works in Ambury Park. AC Parks identified potential impact on cultural values.
- Geological heritage - Site in part of Ambury lava flow, with several lava caves / tubes identified in the vicinity. Cave not evident at construction site but possible that excavations could encounter one.

Environmental effects

- Air discharge - Reasonable separation from residential neighbours (approx. 100 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads, but with access off end of Kiwi Esplanade into Ambury Farm Park
- Trees – No effects
- Ecology – Site used as occasional high tide roost by wading birds – potential for some limited disturbance during construction

Northern Edge Ambury Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,313 m;
- Link Sewer 4 connection to Witla Court: 890m

Construction site location

- Proposed shaft location:
 - minimises distance between tunnel access shafts on either side of the Manukau Harbour
 - allows inspection of TBM before crossing the harbour to ensure it is in good working order
- Construction access off end of Kiwi Esplanade via new access road through Ambury Farm Park to site.



Operation and safety

- Pressure relief air vent optimally located to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location minimises distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Greenfields, rural setting on edge of Ambury Farm Park, but well screened from residential views. Relatively unmodified part of Ambury Farm Park.
- Neighbours - well separated from residential neighbours (approx. 200m)
- Recreation - Adjacent public walkway and some potential conflict with public access during construction requiring local diversions and safety management. AC Parks not in favour of sites in Ambury Park

Cultural & heritage effects

- Cultural heritage - Site identified in Manukau District Plan as Archaeological site & waahi tapu. Site work, including trenching for Link Sewer 4 connection, likely to encounter archaeological sites. Iwi in opposition to construction works in Ambury Park. AC Parks identified potential impact on cultural values.
- Geological heritage - Site in part of Ambury lava flow, with several lava caves / tubes identified in the vicinity. Cave not evident at construction site but possible that excavations could encounter one.

Environmental effects

- Air discharge - Reasonable separation from residential neighbours (approx. 200 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads, but with access off end of Kiwi Esplanade into Ambury Farm Park
- Trees – No effects
- Ecology – Site used as occasional high tide roost by wading birds – potential for some limited disturbance during construction

East Ambury Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,313 m
- Link Sewer 4 connection to Witla Court: 715 m

Construction site location

- Proposed shaft location:
 - approx. 200 m from coast making less suitable location for checking TBM before harbour crossing
 - increased distance between shafts on either side of Manukau Harbour
- Construction access required through part of Ambury Farm Park.



Operation and safety

- Site closer to WWTP so less suitable location for air venting to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location increases distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Greenfields, rural setting on edge of Ambury Farm Park, but largely screened from residential views.
- Neighbours - Reasonable separation from residential neighbours (approx. 150m)
- Recreation - Area used for overnight campervan parking. Conflicts with adjacent public walkway and local diversion required during construction. AC Parks not in favour of this site.

Cultural & heritage effects

- Cultural heritage - Site identified in Manukau District Plan as Archaeological site & waahi tapu. Iwi in opposition to sites in Ambury Park. AC Parks identified potential impact on cultural values.
- Geological heritage - Site in part of Ambury lava flow, with several lava caves / tubes identified in the vicinity. Cave not evident at construction site but possible that excavations could encounter one.

Environmental effects

- Air discharge - Reasonable separation from residential neighbours (approx. 150 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads, but with access through part of Ambury Farm Park
- Trees – No effects
- Ecology – No ecological values of note

Bull Paddock Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,255 m;
- Link Sewer 4 connection to Witla Court: 460m

Construction site location

- Proposed shaft location:
 - approx. 350 m from coast making less suitable location for checking TBM before harbour crossing
 - increased distance between shafts on either side of Manukau Harbour
- Construction access off end of Ambury Rd.



Operation and safety

- Site closer to WWTP so less suitable location for air venting to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location increases distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Greenfields, rural setting on edge of Ambury Farm Park, with some screening from residential views.
- Neighbours – close proximity to residential neighbours (approx. 20m)
- Recreation – Limited effect

Cultural & heritage effects

- Cultural heritage - Three recorded archaeological sites located in vicinity of site. These are identified as R11/1423 (stone heaps), R11/742 (cave and midden in a lava tunnel) and R11/1424 (depression and stone heaps). Iwi in opposition to construction works in Ambury Park. AC Parks identified potential impact on cultural values.
- Geological heritage - Site in part of Ambury lava flow, with several lava caves / tubes identified in the vicinity. Cave not evident at construction site but possible that excavations could encounter one.

Environmental effects

- Air discharge - Limited separation from residential neighbours (approx. 20 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads
- Trees – No effects
- Ecology – No ecological values of note

Muir Ave Park Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,166 m;
- Link Sewer 4 connection to Witla Court: 177 m

Construction site location

- Proposed shaft location:
 - approx. 450 m from coast making less suitable location for checking TBM before harbour crossing
 - increased distance between shafts on either side of Manukau Harbour
- Construction access off Muir Ave direct into park.



Operation and safety

- Site closer to WWTP so less suitable location for air venting to avoid tunnel pressurisation and damage during tunnel filling.
- Access shaft location increases distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Open space setting in local neighbourhood park, difficult to screen from residential views.
- Neighbours – residential areas in close proximity on all sides (approx. 20m)
- Recreation – Significant impact on local use of park during construction

Cultural & heritage effects

- Cultural heritage - Site in modified area with no known archaeological evidence
- Geological heritage – no known sites of interest.

Environmental effects

- Air discharge - Limited separation from residential neighbours (approx. 20 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads
- Trees – No effects
- Ecology – No ecological values of note

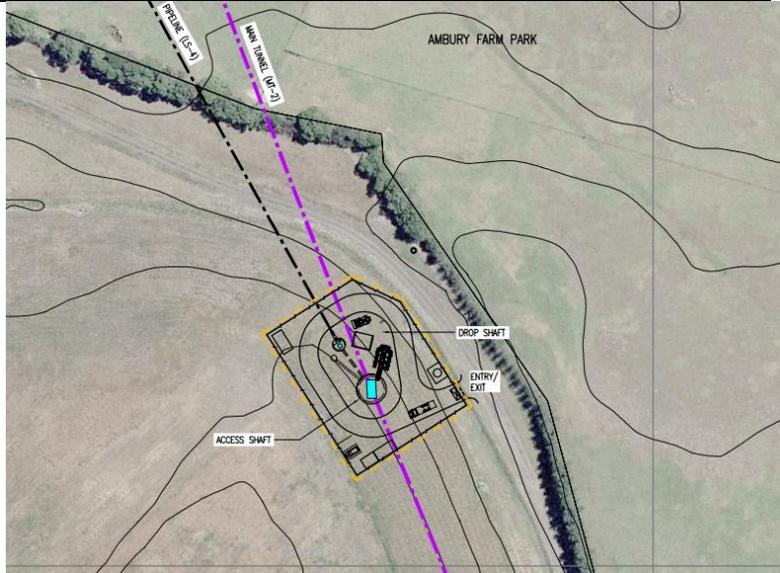
Watercare Land Site

Tunnel alignment and connections

- Main tunnel length PS 23 – WWTP: 4,173 m;
- Link Sewer 4 connection to Witla Court: 830 m

Construction site location

- Proposed shaft location:
 - approx. 1 km from coast making unsuitable location for checking TBM before harbour crossing
 - increased risk profile
 - increased distance between shafts on either side of Manukau Harbour
- Link sewer 4 would cross Refinery pipeline
- Construction access utilising Watercare access roads from WWTP.



Operation and safety

- Site closer to WWTP so less suitable location for air venting to avoid tunnel pressurisation and damage during tunnel filling. Further hydraulic modelling is needed to confirm whether an additional vent shaft is required.
- Access shaft location increases distances for maintenance workers in section under harbour.

Land use effects

- Landscape - Rural setting on land to west of Ambury Farm Park, well screened from residential views, with existing restoration plantings.
- Neighbours - Well separated from residential neighbours (approx. 300m)
- Recreation – limited effect

Cultural & heritage effects

- Cultural heritage – Land adjacent Ambury Park but has been subject to previous modification and unlikely to have cultural sites remaining. Trenching through Ambury Farm Park for Link Sewer 4 connection likely to encounter archaeological sites. Iwi in opposition to construction works in Ambury Park.
- Geological heritage - Site adjacent to / in filled explosion crater.

Environmental effects

- Air discharge - Well separated from residential neighbours (approx.300 m). Air treatment for discharge which may occur during tunnel filling in normal wet weather events
- Traffic - Low level of traffic generation during construction will be well within capacity of local roads, but with access through Ambury Farm Park which will require traffic controls to manage public safety
- Trees – possible removal of restoration plantings
- Ecology – Recent restoration plantings and some high tide roost by wading birds – potential for some limited disturbance during construction