

## Memorandum

To

From

Date

Subject COM-2009-1374 - 19 Titch Place, Glen Eden  
New 5 Bedroom Dwelling with attached (internal access) garage. Cat 2.

Information provided as at 02 October 2009:

### Hazard / Special Features Geotech

- a. The Owner shall not carry out any development nor place, erect, construct or permit to remain any buildings on any part of the land unless the foundations of all buildings have been the subject of specific design by a registered engineer who is familiar with the content of the Geotechnical Completion Report prepared by Babbage Consultants Reference 42608/GE and dated October 2007 (held in Council's records under RMA20061078 ) (hereinafter referred to as "the said Geotechnical Completion Reports)
- b. All earthworks, development and construction on any part of the land shall be carried out in accordance with:
- (i) The report referred to herein where applicable; and
  - (ii) All specific design requirements referred to herein where applicable; and
  - (iii) To the entire satisfaction of the Waitakere City Council.

**Wind Zone:**

Low

**Sea Spray Zone:**

No

DATA

# EcoWater (Network Utility Operator) Checklist for Building & Resource Consents

Application Address:	19 T. Rd M	LUC-
Applicant Name:		SUB-
Type of Development:		ABA-
		COM- 2m9-1374
Checklist Completed By:	J. J. J.	Date: 9/10/09
Assets & Network Approvals By:		Date:
Quality Check & Approvals By:		Date:

APPLICATION & SITE INFORMATION	CHECKLIST ITEM	DP, COP, POLICY (Specification)	ASSESSMENT (Fill in Data or Circle One Option)			
	Infringement Types (relating to EcoWater)	Consent Document / Planner				
	Notified Consent	Consent Document / Planner	yes	no	n/a	if yes, Team Leader sign-off
	Pre-Application - RMA Number	PRE-	yes	no	n/a	
	Pre-Application - OSS Advice	DS Database/Pathway Property Memo	yes	no	n/a	
	Requisitions (relating to EcoWater)	Pathway / InfoBase	yes	no	n/a	
	Hansen Jobs	Hansen	yes	no	n/a	
	EcoWater Property File	relevant documents or advice	yes	no	n/a	
	Human Environment	GIS - human environment layer				
	Natural Environment	GIS - natural environment layer				
OTHER APPROVALS REQUIRED	Special Subdivision Area (eg Structure Plan)	DP Maps & Variations	yes	no	n/a	
	Riparian Margin	GIS - natural environment layer	yes	no	n/a	
	Stability Sensitive	requires Geotech report	yes	no	n/a	
	Hazards & Special Features	Pathway Property Conditions	yes	no	n/a	

OTHER APPROVALS REQUIRED	WATERCARE SERVICES LTD					
	Works within 10m of WSL WW or WS lines.	WSL approval given in writing	yes	no	n/a	if no, applicant must provide
	Trade Waste Discharge Consent	WSL approval for industrial discharge	yes	no	n/a	if no, applicant must provide
	AUCKLAND REGIONAL COUNCIL					
	WCC comprehensive discharge consent	application complies with CMP	yes	no	n/a	if no, amend proposal or apply to ARC
	Urban - new impermeable >1000m <sup>2</sup>	pipe discharges to coast / tidal area	yes	no	n/a	SWQT, energy dissipation
		pipe discharges to fresh water stream	yes	no	n/a	SWQT, energy dissipation, detention
	New pipe outlet to coastal or stream environ.		yes	no	n/a	
	Rural - more than 5 Lot subdivision		yes	no	n/a	
	Filling in 1%AEP floodplain		yes	no	n/a	
OTHER APPROVALS REQUIRED	Downstream flooding or erosion		yes	no	n/a	
	Works within 50m of a watercourse		yes	no	n/a	
	Culvert more than 20m long		yes	no	n/a	
	WCC ASSETS & NETWORK					
	Building over/near >150mm WW drain	approval given	yes	no	n/a	if no, amend proposal
	Building over/near >350mm SW drain	approval given	yes	no	n/a	if no, amend proposal
	Building platform clear of large drains	(build over, reroute, amend boundaries)	yes	no	n/a	if no, discuss with Team Leader
	Stream crossing	approval given (bridge or culvert)	yes	no	n/a	
	Esplanade reserve if stream >3m wide	check if required by Parks	yes	no	n/a	
	Drainage reserve	required by Assets	yes	no	n/a	
OTHER APPROVALS REQUIRED	Utility reserve	required by Assets	yes	no	n/a	
	Twin Streams property purchase	property identified for purchase	yes	no	n/a	if yes, discuss with Team Leader
	NEIGHBORING PROPERTIES					
	Services connection points located in neighbouring properties	Private agreement for access (no Council involvement)	yes	no	n/a	Add to SPECDE report & alert planner. Condition - cannot commence consent until connections in place.

EARTHWORKS & GEOTECH	Earthworks near stream / overland flowpath	inside 1%AEP flood area	yes	no	n/a	if yes, discuss with Team Leader
	Earthworks over drains	minimum coverage 1200mm roads	yes	no	n/a	
		minimum coverage 750mm other	yes	no	n/a	
		max. coverage 2000mm (class 2)	yes	no	n/a	
		raise manhole lid level & access	yes	no	n/a	
		lower manhole lid level & access	yes	no	n/a	
	retaining walls over/within 2m of drains	bridging piles - min. clearance 1m	yes	no	n/a	
	Geotech Report	instability, slips, stream erosion	yes	no	n/a	
		specific stormwater disposal	yes	no	n/a	
		specific wastewater disposal	yes	no	n/a	
		specific pipe/trench design	yes	no	n/a	

CHECKLIST ITEM	DP, COP, POLICY (Specification)	ASSESSMENT (Fill In Data or Circle One Option)				
		yes	no	n/a		
Supercatchment name	GIS - project table - StwSupCatShp				<i>Henderson Creek Swch</i>	
Catchment Management Plan	proposal complies with CMP	yes	no	n/a		
Integrated Catchment Management Plan	proposal complies with ICMP	yes	no	n/a		
WCC - Comprehensive Discharge Consent	proposal complies with CDC	yes	no	n/a		
Site affected by flooding or overland flow	close to stream or large dia SW pipes	yes	no	n/a		
Flooding assessment provided (open stream)	check rainfall, catchment area etc	yes	no	n/a		
Geotech assessment of stream bank erosion	check, setback required	yes	no	n/a		
Riparian Margin	refer GIS natural areas map	yes	no	specify:		
Overland flowpath assessment provided	check rainfall, catchment area etc	yes	no	n/a		
Easements required for flood areas		yes	no	n/a		
Crossing major stream - bridge required	check abutments, x-section, velocity	yes	no	n/a		
Driveways <200mm flood during 1%AEP		yes	no	n/a		
Private culverts - 5yr capacity & condition	as-built, cctv, calcs, erosion, upgrade	yes	no	n/a	adequate	upgrade
Fish Passage on culverts / outlets	complies with TP131	yes	no	n/a		
Piping of stream proposed	not allowed, not in accord with policy	yes	no	n/a	if yes, discuss with Team Leader	
Buildings entirely outside 1%AEP floodplain	refer DP, Hazards	yes	no	n/a	if no, discuss with Team Leader	
Minimum floor level required	Manukau Coastal - R.L. 2.74m + 1.0m	yes	no	n/a		
	Waitemata Coastal - R.L. 2.25m + 1.0m	yes	no	n/a		
	All Streams - 0.5m freeboard	yes	no	n/a		
	OLFP Catchment >2Ha - 0.5m freeboard	yes	no	n/a		
	OLFP Catchment <2Ha - 0.2m freeboard	yes	no	n/a		
	specified in Flood Report	yes	no	n/a		

INFRASTRUCTURE - WATER SUPPLY	WS - existing connection	GIS, Pathway Water Billing	yes	no	n/a	new connection	
	WS - separate meters for each Unit/Lot	check Pathway, manifold for units	yes	no	n/a	new connection	
	WS - backflow prevention required	check COP and ByLaw	yes	no	n/a		
	WS - building over waterpipes	not allowed - reroute waterpipes	yes	no	n/a		
	WS - pressure zones	change at approx R.L. 60.0m	yes	no	n/a		
	WS - pressure to long/steep driveways	check HGL minus R.L. is >35m	yes	no	n/a		
	WS - new public water main	not under driveway/carriageway	yes	no	n/a		
	WS - tank supply only	reduce mitigation requirements	yes	no	n/a		
	Fire hydrant within 270m / 135m / 90m / 65m	GIS - use ruler (along roads/driveways)	yes	no	n/a	existing	new
	Fire hydrant - flow available for NZFS Class		Res-25/s	schl-50/s	ind-100/s	lge comm-200/s	
	Domestic sprinkler system for fire coverage	check water supply system capacity	yes	no	n/a		
	Rural / Urban fire districts	GIS - project tbl - RuralFire... / UrbanFire...	Urban	Huaia	Piha	Waiaatarua	Rural
	Urban fire district without fire coverage	design provided to NZFS COP	yes	no	n/a		

INFRASTRUCTURE - WASTE WATER	WW - inner drainage area (reticulated)	GIS - project table - InnerDmBdy	yes	no	n/a		
	WW - works over/within 2m of drains/MHs	1m clear, cctv, no build over connections	yes	no	n/a		
	WW - pipe material earthenware	automatic relay required (no CCTV)	yes	no	n/a	(for building consent)	
	WW - pipe material AC/PVC/PE	CCTV - relay if bad condition	yes	no	n/a	(for building consent)	
	WW - existing connection/disconnect	GIS - Infrastructure Layer	yes	no	n/a	dry chamber	new
	WW - all of site served by gravity	1m above invert of public drain or pump	yes	no	n/a	if no, discuss with Team Leader	
	WW - new public drainage	refer COP, no conflict with trees	yes	no	n/a	if yes, discuss with Team Leader	
	WW - new public drainage	serve upstream catchment	yes	no	if yes:	construct	easement
	WW - privately owned drains	check ownership in GIS	yes	no	if yes:	can't authorise - need owners approval	
	WW - on-site disposal (septic systems)	GIS - Infrastructure Layer	yes	no	n/a	existing	new

INFRASTRUCTURE - STORM WATER	SW - works over/within 2m of drains/MHs	1m clear, cctv, no build over connections	yes	no	n/a		
	SW - existing connection/disconnect	GIS - Infrastructure Layer	yes	no	n/a	wet chamber	new
	SW - all of site served by gravity	1m above soffit of public drain	yes	no	n/a	if no, discuss with Team Leader	
	SW - downstream capacity for MPD	check GIS modelling	under	over	unknown	if under, require SW mitigation	
	SW - new public drainage	within 100m of bdy, no conflict with trees	yes	no	n/a	if yes, discuss with Team Leader	
	SW - new public drainage	serve upstream catchment	yes	no	if yes:	construct	easement
	SW - privately owned drains	check ownership in GIS	yes	no	if yes:	can't authorise - need owners approval	
	SW - existing discharge point	check GIS, as-builts, consent plans etc	pipe	kerb	soakage	watercourse	coast
	SW - approved discharge point	stormwater pipe connection (reticulated)	yes	no	if yes:	may be subject to conditions	
	SW - approved discharge point	kerb & channel (non-reticulated)	yes	no	if yes:	mitigation required	
	SW - approved discharge point	soakage (non-reticulated)	yes	no	if yes:	mitigation required	
	SW - approved discharge point	watercourse (new outfall)	yes	no	if yes:	mitigation required	
	SW - approved discharge point	coastal outfall	yes	no	if yes:	stormwater quality treatment required	

CHECKLIST ITEM		DP, COP, POLICY (Specification)	ASSESSMENT (Fill In Data or Circle One Option)				
STORMWATER MANAGEMENT / LOW IMPACT DESIGN / TUSC	Stormwater mitigation for storm events	refer CMP, pipe modelling, COP, ARC	2	10	100	34.5mm/24hrs	
	Impermeable Surfaces allowed	refer District Plan Rules	10%	15%	20%	60%	90%
	Impermeable Surfaces restricted	refer Consent Notice / previous SUB	specify:				
	Impermeable Surfaces exceed allowable %	refer site plan - actual %	yes	no	n/a	if yes, require SW mitigation	
	iCMP Req Low Impact Design (LID)		yes	no	n/a		
	TUSC - Dev Con Remission	outline mitigation requirements below	yes	no	n/a	TUSC score:	
	Bush Planting	mitigate 1%AEP or pay Twin Streams	yes	no	area:		
	Twin Streams Payment	mitigate 1%AEP or pay Twin Streams	yes	no	amount:		
	Rain Water Reuse Tank (full or partial)	mitigates 1/2 roof area, max 100m <sup>2</sup>	yes	no	size:		
	Detention Tank	mitigation level required	yes	no	size:		
	Low Flow Water Saving Devices		yes	no	size:		
	Rain Garden		yes	no	size:		
	Permeable Paving		yes	no	size:		
	Downstream Stormwater Quality Device	check pipe system discharge point	yes	no	size:		
	CONTRIBUTIONS	Development Contribution - TUSC Remission		yes	no	n/a	remission:
Financial (RMA) - Water Supply		GIS project tbl - Developer Contr.	yes	no	n/a		\$
Financial (RMA) - Wastewater		GIS project tbl - Developer Contr.	yes	no	n/a		\$
Financial (RMA) - Stormwater Quantity		GIS project tbl - Developer Contr.	yes	no	n/a		\$
Financial (RMA) - Stormwater Quality		GIS project tbl - Developer Contr.	yes	no	n/a		\$
Financial (RMA) - Twin Streams Oratia		zone/proposal (credit bush planting)	med.dens	resid.	foothills	commercial	\$
Financial (RMA) - Twin Streams Opanuku		zone/proposal (credit bush planting)	med.dens	resid.	foothills	commercial	\$
WCC contribution towards cost of asset		discuss with Assets and T.L.	yes	no	specify: %		\$ (max)
MEDIUM DENSITY & APARTMENT DEVELOPMENTS	Building over public drains	not allowed - reroute drains	yes	no	n/a		
	Public drains in front yards (not under drive)		yes	no	n/a		
	Avoid retaining walls over new public drains		yes	no	n/a		
	Private drainage or devices	body corporate rules - maintenance	yes	no	n/a	only private if no upstream catchment	
	Cutoff drains & fall from basement parking		yes	no	n/a		
	Basement - cesspits pump to sewer/SWQT	no SWQT for basement parking	yes	no	n/a		
	Check public watermain capacity/pressure	may need to upgrade public mains	yes	no	n/a		
	Internal fire sprinkler system	check flow rates available	yes	no	n/a		
	Water supply pressure zones per floor		yes	no	n/a		
	Bulk Council water meter & private meter/unit	body corporate rules - water charging	yes	no	n/a		
SUBDIVISION	SW contribution charged by impermeable m <sup>2</sup>		yes	no	n/a		
	Unit title subdivision (will have body corp.)	private devices and drains OK	yes	no	n/a		
	Cross lease	separate private drainage	yes	no	n/a		
		consent notice re shared drainage	yes	no	n/a		
	Freehold subdivision	platform free of hazards/large drains	yes	no	n/a	if no, discuss with Team Leader	
		all public devices and drains	yes	no	n/a	if no, discuss with Team Leader	
		culvert under shared drive - private	yes	no	n/a	if no, discuss with Team Leader	
		boundaries over manholes	yes	no	n/a	if no, amend plans	
		ICT Infrastructure on new public road	yes	no	n/a	condition to require ICT	
		sites large enough for on-site WW	yes	no	n/a	if no, amend plans	
		on-site WW disposal all within bdy	yes	no	n/a	if yes, amend plans or move WW	
Urban Design (liase with Parks/Roads etc)	road next to stream or reserve	yes	no	n/a			
	integrated SW devices/amenity	yes	no	n/a			

1. Your application will only be accepted if the information outlined in this checklist is provided.
2. Please work through this checklist and circle the information that you have provided.
3. Two (2) sets of plans and other documents are required; include a third copy of floor plans.
4. Drawings must be produced on a minimum A3 sheet size.
5. Only original copies will be accepted.
6. All drawings must meet the minimum requirements of the Technical Drawings standard AS/NZS1100 with equivalent Microsoft Word text size 11 (**free-handed drawings will not be accepted**)
7. If a Project Information Memorandum (PIM) has already been issued for this project, please provide a copy with this application.
8. 2<sup>nd</sup> hand building report is required if using second-hand materials or buildings.
9. If building is positioned over two or more allotments, a third set of plans is required.

**Declaration**

This section must be completed by applicant (*Please cross-out what is not applicable from the following statements*):

1. This work ~~is~~ **is not** covered by a WHRS claim.
2. This work ~~does~~ **does not** involve re-cladding as a result of leaking.
3. This work ~~includes~~ **excludes** monolithic cladding.
4. This application ~~includes~~ **excludes** a swimming pool or spa pool.
5. This property ~~is~~ **is not** known to be in a flood affected area.
6. The building ~~does~~ **does not** involve building over an existing boundary or two lots.
7. This building work ~~is~~ **is not** as a result of a notice to fix.

Applicant's Signature: \_\_\_\_\_

Date: 24/9/09

**For Council Use only:**

Consent Number: \_\_\_\_\_

Wind Zone: LowDistrict Plan: Human Environment Living

PIM Number: \_\_\_\_\_

District Plan: Natural Area General

Natural Hazards \_\_\_\_\_

Hazardous Facilities / Contaminated Sites \_\_\_\_\_

Other Relevant Consent Number/s: \_\_\_\_\_

Stability Sensitive (Waitemata District Scheme) \_\_\_\_\_

Heritage Status \_\_\_\_\_

Impact on Waahi tapu? Yes / No

Archaeological Site? Yes / No

Customer Use				Council Use Only			
Circle as appropriate	Y	N	NA	Doc reference/Para#			Comments
<input checked="" type="radio"/>	Y	N	NA		Application form completed in full and signed	<input checked="" type="radio"/>	Y N NA
<input checked="" type="radio"/>	Y	N	NA		Water meter connection and location plan	<input checked="" type="radio"/>	Y N NA
<input checked="" type="radio"/>	Y	N	NA		Vehicle crossing form (if applicable)	<input checked="" type="radio"/>	Y N NA
<input checked="" type="radio"/>	Y	N	NA		Street damage exists – notification received	<input checked="" type="radio"/>	Y N <input checked="" type="radio"/> NA
<input type="radio"/>	Y	N	<input checked="" type="radio"/> NA		Application for septic tank (if applicable)	<input type="radio"/>	Y N <input checked="" type="radio"/> NA
<input type="radio"/>	Y	N	<input checked="" type="radio"/> NA		Second hand building materials	<input type="radio"/>	Y N <input checked="" type="radio"/> NA
<input type="radio"/>	Y	N	<input checked="" type="radio"/> NA		Road Opening Notices (RON)	<input type="radio"/>	Y N <input checked="" type="radio"/> NA
<input type="radio"/>	Y	N	<input checked="" type="radio"/> NA		Compliance Schedule	<input type="radio"/>	Y N <input checked="" type="radio"/> NA

<b>Customer Use</b>			<b>Council Use Only</b>		
<b>Check</b>	<b>Form</b>	<b>Form</b>	<b>Form</b>	<b>Form</b>	<b>Form</b>

Y	N	NA	Swimming Pool Registration	Y	N	NA	
Y	N	NA	Approval from Parks Department to build on Council Reserve	Y	N	NA	
Y	N	NA	Application to erect a structure on a road reserve	Y	N	NA	
<b>Proof of Ownership</b>							
Y	N	NA	Certificate of title and flats plan (no older than 90 days)	Y	N	NA	
Y	N	NA	Sale and purchase agreement (full copy)	Y	N	NA	
Y	N	NA	Letter from owner if applicant / agent is not owner (state details of the Authorisation from the owner to make the application on the owner's behalf)	Y	N	NA	
Y	N	NA	If application is submitted on behalf of company/trust include copy of authorising documents for the company/trust.	Y	N	NA	
<b>Resource Consents (if copy only)</b>							
Y	N	NA	Copy of approved resource consent or reference number if application has been lodged (record consent number in comments)	Y	N	NA	RMA 2006 1077
<b>District Plan / Site Plan Requirements (2 x copies of each of the following plans)</b>							
Y	N	NA	<b>Cross-lease property</b> (minimum scale 1:100)	Y	N	NA	
Y	N	NA	Show entire property including boundaries for each unit and any common areas	Y	N	NA	
Y	N	NA	<b>Rural property</b> Full site plan (note: smaller scale may be used for large sites)	Y	N	NA	
Y	N	NA	o Source of potable water supply	Y	N	NA	
Y	N	NA	o Test Report required if bore water being used	Y	N	NA	
Y	N	NA	<b>All other property</b> (minimum scale 1:100)	Y	N	NA	
Y	N	NA	Show all existing and proposed building and eaves line	Y	N	NA	
Y	N	NA	Legal description and street address	Y	N	NA	
Y	N	NA	Vehicle access and manoeuvring, finished levels of driveway. Each car park space must have dimensions of at least 2.5 x 5.0m and slope not exceeding 1 in 16 (6.25%)	Y	N	NA	
Y	N	NA	Designated space (i.e. outdoor space - in living and rural villages only)	Y	N	NA	
Y	N	NA	Site area and boundary dimensions	Y	N	NA	
Y	N	NA	Building set-out (yard dimensions)	Y	N	NA	
Y	N	NA	Calculations for building coverage	Y	N	NA	
Y	N	NA	Calculations for existing and proposed impermeable surfaces (totals for each)	Y	N	NA	
Y	N	NA	North point, boundary bearings	Y	N	NA	

Y	N	NA	Datum and contours (or spot levels) Provide spot levels at corners of new building work and on the site boundaries immediately adjacent and at any point from which a height to boundary recession plane is measured.	Y	N	NA	
Y	N	NA	Volume of earthworks including cut and fill, including provision for silt control	Y	N	NA	} Sites are already "benched" as per the Resource Consent.
Y	N	NA	Differentiate between the earthworks within the building eaves line and outside the eaves line	Y	N	NA	
Y	N	NA	Retaining walls – proposed heights	Y	N	NA	
Y	N	NA	Site management plan showing: <i>Provisions for the protection of public, suppression of dust, disposal of debris, disconnection from public utilities and suppression of noise, traffic management</i>	Y	N	NA	
Y	N	NA	Identify any trees protected by the District Plan, location, species, height, girth, extent of drip-line of all trees (incl. overhanging from neighbouring property and clearance required)	Y	N	NA	
Y	N	NA	Watercare Services Ltd. Approval if building within 10m of WSL line	Y	N	NA	
Y	N	NA	Show vehicle crossing – show 50 meters of roadway in each direction	Y	N	NA	
Y	N	NA	Finished floor level (relative to ground levels)	Y	N	NA	
<b>Drainage Plan</b>							
Y	N	NA	Existing drainage	Y	N	NA	
Y	N	NA	New private and public drainage/water course if to be used including manholes / invert levels	Y	N	NA	
Y	N	NA	Septic tank and effluent	Y	N	NA	
Y	N	NA	Protection of public drains (if bridging or in close proximity a video maybe required) Buildings over or within 1.0m of a public sewer require a bridging design including actual invert levels	Y	N	NA	
Y	N	NA	o Stormwater disposal	Y	N	NA	
Y	N	NA	o Detention / retention tanks	Y	N	NA	
Y	N	NA	o Location of HWC, if external	Y	N	NA	
Y	N	NA	Retaining Walls	Y	N	NA	
Y	N	NA	o Show provisions for drainage	Y	N	NA	
<b>Floor Plan (minimum scale 1:50 / Please provide extra copy)</b>							
Y	N	NA	Proposed use of all spaces e.g. kitchen, bathrooms, toilets, etc.	Y	N	NA	
Y	N	NA	All rooms fully dimensioned	Y	N	NA	
Y	N	NA	Drawings must show key for elevations and include floor areas	Y	N	NA	
Y	N	NA	Smoke alarms and locations	Y	N	NA	
Y	N	NA	Window location / size	Y	N	NA	
Y	N	NA	Lintel / specific designed beams sizes	Y	N	NA	As marked on specific Lintel Plan As Marked on specific Bracing Plan
Y	N	NA	Bracing type, location and length	Y	N	NA	
Y	N	NA	Location and type of hot water cylinder	Y	N	NA	

Customer Use		Council Use Only	
Project Name	Project Address	Project Name	Project Address

Y	N	NA	Location and type of heating – solid fuel / gas	Y	N	NA	
Y	N	NA	Alterations	Y	N	NA	
Y	N	NA	Existing floor plan and use of space	Y	N	NA	
Y	N	NA	Proposed floor plan and use of space	Y	N	NA	
Y	N	NA	New work must be clearly defined	Y	N	NA	
<b>Foundation – fully dimensioned (scale 1:100 or 1:50)</b>							
Y	N	NA	Timber – pile type, size, location, fixing details	Y	N	NA	
Y	N	NA	Sub-floor bracing, location, type, fixing details	Y	N	NA	
Y	N	NA	Bracing calculations and layout	Y	N	NA	
Y	N	NA	Bearer size and connection details	Y	N	NA	
Y	N	NA	Floor joist layout and size	Y	N	NA	
Y	N	NA	Concrete – width and depth of footing	Y	N	NA	
Y	N	NA	Masonry and reinforcing details	Y	N	NA	- specific design
Y	N	NA	Slab dimensions, point loads, pads, eg. Plumbing fixtures	Y	N	NA	- specific design
Y	N	NA	Mesh size and type	Y	N	NA	- specific design
Y	N	NA	Damp proof membranes	Y	N	NA	
Y	N	NA	Raft floor – engineers design and calculations	Y	N	NA	Specific design attached.
<b>Elevations (scale 1:100 or 1:50)</b>							
Y	N	NA	Each external face of the building	Y	N	NA	
Y	N	NA	Existing and finished ground levels	Y	N	NA	
Y	N	NA	Ground clearances and cladding clearance	Y	N	NA	
Y	N	NA	Joinery openings	Y	N	NA	
Y	N	NA	Roof cladding and pitch	Y	N	NA	
Y	N	NA	Eaves overhang	Y	N	NA	
Y	N	NA	Gutter	Y	N	NA	
Y	N	NA	Cladding type	Y	N	NA	
Y	N	NA	Control joint location (if applicable)	Y	N	NA	
Y	N	NA	Subfloor access and ventilation	Y	N	NA	
Y	N	NA	Deck, balconies, chimney, and pergolas	Y	N	NA	
Y	N	NA	Height in relation to boundary – building in relation to site boundaries. Spot levels on elevation drawings	Y	N	NA	As per Resource Consent
Y	N	NA	Maximum height. Demonstrate compliance by rolling height or mean ground level method. Calculations may be required. (8 metre maximum height in Living Environment Zone)	Y	N	NA	As per Resource Consent
<b>Cross-sections (minimum scale 1:50) referencing all details and sheet numbers to full demonstrate scope of work</b>							
Y	N	NA	Cross-sections and long-sections	Y	N	NA	
Y	N	NA	Foundation / slab details showing	Y	N	NA	
Y	N	NA	o piles, footing depth and width	Y	N	NA	
Y	N	NA	o damp proof membrane	Y	N	NA	
Y	N	NA	Timber floor construction details	Y	N	NA	
Y	N	NA	o treatment level and type and fixing details	Y	N	NA	
Y	N	NA	o insulation (type and R value)	Y	N	NA	

Customer Use			Council Use Only		
Check appropriate	Does reference UFGC				Comments

Y	N	NA	o ground clearance in sub-floor space	Y	N	NA	
Y	N	NA	Wall framing construction details	Y	N	NA	
Y	N	NA	o treatment level and type (grade)	Y	N	NA	
Y	N	NA	o wall lining / insulation / building paper	Y	N	NA	
Y	N	NA	o wall cladding / cavity	Y	N	NA	
Y	N	NA	o finished floor levels	Y	N	NA	
Y	N	NA	Roof framing construction details	Y	N	NA	
Y	N	NA	o roof pitch	Y	N	NA	
Y	N	NA	o ceiling lining / insulation / building paper	Y	N	NA	
Y	N	NA	o roof cladding	Y	N	NA	
Y	N	NA	Retaining walls and drainage design	Y	N	NA	
Y	N	NA	Structural components and fixings	Y	N	NA	
Y	N	NA	Stairs and decks	Y	N	NA	
Y	N	NA	o barrier construction details	Y	N	NA	
Y	N	NA	o pitch, tread, riser heights	Y	N	NA	
<b>Roof framing (scale 1:100 or 1:50)</b>							
Y	N	NA	Truss or rafter layout shown as a buildable design	Y	N	NA	
Y	N	NA	Spacing and dimensions of all roof framing	Y	N	NA	
Y	N	NA	Roof catchments area, fall direction and gutter size	Y	N	NA	
Y	N	NA	Downpipe sizes and location	Y	N	NA	
Y	N	NA	Roof bracing	Y	N	NA	
Y	N	NA	Area and type of all membrane roofs	Y	N	NA	
Y	N	NA	Outfall and overflow locations	Y	N	NA	
Y	N	NA	Lintels & specific design beams	Y	N	NA	- see specific lintel plan.
<b>Floor framing (minimum scale 1:50) required for each level of the building</b>							
Y	N	NA	<b>Subfloor and decks</b>	Y	N	NA	
Y	N	NA	Pile type, size and location	Y	N	NA	
Y	N	NA	Sub-floor braces (location and direction)	Y	N	NA	
Y	N	NA	Bearer size, span and spacing	Y	N	NA	
Y	N	NA	Floor joist size, span and spacing	Y	N	NA	
Y	N	NA	Bracing calculations	Y	N	NA	
Y	N	NA	o subfloor	Y	N	NA	
Y	N	NA	o deck if > 2.0m wide	Y	N	NA	
Y	N	NA	Exposed deck fixings to be stainless steel or hot dipped galvanised with epoxy coating	Y	N	NA	
Y	N	NA	<b>Timber mid-floor</b> - joist layout, spacing, size, stairwell openings, treatment type and level	Y	N	NA	
Y	N	NA	<b>Concrete mid floor</b> - reinforcing, mesh, shrinkage control joints, damp proof membrane and thickness, point loads pads and thickenings	Y	N	NA	
Y	N	NA	<b>Floor framing plans must also show</b> - plumbing and drainage fixtures, pipe sizes and location	Y	N	NA	

<b>Contractor Use</b>	<b>Local Authority Use</b>	<b>Council Use Only</b>	
Contract approved	Contract signed	Contract signed	Contract signed

Cladding details (scale 1:10 or 1:5) Drawings should be of sufficient scale and detail to enable construction							
<input checked="" type="checkbox"/>	N	NA	Flashing details for window, doors and other openings including	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o head, jamb and sill	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o parapets	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o balconies / decks	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o balustrades	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o apron flashings	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o junctions and interfaces	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o roof penetrations	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o meter box, pipes, penetrations, flashings	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Control joint design and location (monolithic only)	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Manufacturer's technical installation details / data	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Product accreditation or appraisal certificates for claddings	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	E2 risk matrix for each wall face	<input checked="" type="checkbox"/>	N	NA	- Risk Matrix worst case.
<b>Plumbing and schematic</b>							
<input checked="" type="checkbox"/>	N	NA	Type of system - AS3500 or NZ Standards	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Plumbing schematic (if 2 or more storeys)	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Fixtures identified	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Vent, waste sizes and materials	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Floor finishes (wet and dry areas)	<input checked="" type="checkbox"/>	N	NA	
<b>Internal elevations</b> NOTE: to be provided where the cross-sections or floor plans do not show the finishes and materials for walls and floors.							
<input checked="" type="checkbox"/>	N	NA	Wall finishes (wet and dry areas)	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Benches - surface finish	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Shower / bath - construction and waterproofing details	<input checked="" type="checkbox"/>	N	NA	
<b>Specifications (2 copies minimum) Generic specifications will not be accepted.</b>							
<input checked="" type="checkbox"/>	N	NA	Specification relevant to project	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Appropriate standards referenced	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	All technical sections or trades covered	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Types of materials, finishes and fixings to be used	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Heating (manufacturer's details)	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Hot water (manufacturer's details and seismic restraint)	<input checked="" type="checkbox"/>	N	NA	
<b>Product Literature (2 copies minimum)</b>							
<input checked="" type="checkbox"/>	N	NA	Technical data sheets for products to be used	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Installations instructions	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Product certification / appraisal certificates	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Maintenance schedule	<input checked="" type="checkbox"/>	N	NA	
<b>Bracing Calculations (2 copies minimum)</b>							
<input checked="" type="checkbox"/>	N	NA	Wind zone defined	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	Wall bracing layout showing length and type of brace - must be shown on plans	<input checked="" type="checkbox"/>	N	NA	- See Specific bracing plan.

Customer Use		Council Use Only	
Current appropriate	Not referenced		Comments

<input checked="" type="checkbox"/>	N	NA	Wall bracing calculation sheets (required for each floor level)	<input checked="" type="checkbox"/>	N	NA	- in spec
Y	N	NA	Sub-floor bracing calculations	Y	N	NA	
Y	N	NA	Deck sub-floor bracing calculations if > 2.0m wide	Y	N	NA	
<b>Design Reports and calculations (2 copies minimum)</b>							
<b>Note: All Engineers (issuing a producer statement) must be registered with the Waitakere City Council.</b>							
<input checked="" type="checkbox"/>	N	NA	Engineering design calculations	<input checked="" type="checkbox"/>	N	NA	PS 1 original copy attached
<input checked="" type="checkbox"/>	N	NA	Engineering must be detailed on plans and show fixing details	<input checked="" type="checkbox"/>	N	NA	
<input checked="" type="checkbox"/>	N	NA	o beams and lintels	<input checked="" type="checkbox"/>	N	NA	
Y	N	NA	o retaining walls	Y	N	NA	
Y	N	NA	o other	Y	N	NA	
<input checked="" type="checkbox"/>	N	NA	Geotechnical report - a geotechnical report must be provided for sites steeper than 1:4 or where there are fill or stability issues	<input checked="" type="checkbox"/>	N	NA	Geotech report attached.
Y	N	NA	Swimming pool design and fencing	Y	N	NA	
Y	N	NA	Fire report	Y	N	NA	
Y	N	NA	Septic tank and effluent design	Y	N	NA	
Y	N	NA	Soakage reports and construction details	Y	N	NA	
Y	N	NA	Material compatibility schedule	Y	N	NA	
Y	N	NA	Where glazing exceeds 30% of wall area an alternative solution must be provided	Y	N	NA	- Schedule Method glazing under 30%
Y	N	NA	Acoustic reports (high noise route or Whenuapai Airbase contours, living accommodation in the working/community environment)	Y	N	NA	
<b>Comments:</b>							

Lodgement Officer:

Danny Chan

Date:

28/9/09

**Please Note:**

This document has been produced to assist in the preparation of the documents required in the application of the Building Consent and is not in any way or form a Technical Processing Checklist.

Once processing commences, information may still be requested to ensure compliance with the Building Act 2004, the NZ Building Code, and the Waitakere City council District Plan.

We strongly recommend adhering to standard drafting practice (as outlined in NZ/AS 1100) and refer to the Department of Building and Housing (DBH) - "Guidelines to applying for a Building Consent". This can be found on the DBH website ([www.dbh.govt.nz](http://www.dbh.govt.nz)) or hard copies are available at our offices.

The Building Consent Authority (BCA) requires all construction information and details to be provided on the relevant drawings, using clear scales and presented in a manner that can be efficiently processed.

This Application Checklist may change due to our ongoing commitment to quality and education.



# COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



Search Copy

  
R. W. Muir  
Registrar-General  
of Land

Identifier **163628**  
Land Registration District **North Auckland**  
Date Issued **02 September 2004**

**Prior References**  
NA117B/312

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**Estate** Fee Simple  
**Area** 4.9336 hectares more or less  
**Legal Description** Lot 2 Deposited Plan 339810

**Proprietors**  
New Zealand Housing Foundation

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**Interests**

Subject to a pipeline right over part marked B on DP 339810 created by Transfer B344219.1 - 30.10.1984 at 10.55 am  
Subject to an oil and gas supply right (in gross) over part marked B on DP 339810 in favour of Natural Gas Corporation of New Zealand Limited created by Transfer B344219.1 - 30.10.1984 at 10.55 am  
6135712.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 2.9.2004 at 9:00 am  
Subject to a drainage easement (in gross) over part marked K, B & G on DP 339810 in favour of the Waitakere City Council created by Easement Instrument 6135712.4 - 2.9.2004 at 9:00 am  
The easements created by Easement Instrument 6135712.4 are subject to Section 243 (a) Resource Management Act 1991  
6551320.5 Mortgage to Housing New Zealand Corporation - 29.8.2005 at 9:00 am

# IMPORTANT NOTICE

All Building consent documents must be kept on site during construction. Unless the siting of the proposed building is certified by a registered surveyor all boundary poles are to be flagged prior to work commencing. A fence or an established site may be taken as the boundary in the written agreement of all neighbours.

SSMH 3B  
Depth: 1.65  
IL: 20.66  
LL: 22.31

SSMH C5  
Depth: 3.30  
IL: 20.10  
LL: 23.40

SSMH 3C  
Depth: 1.13  
IL: 22.22  
LL: 23.35

6m outdoor living area

PROPOSED RESIDENCE  
FL: 23.35

19 TITCH PLACE



## NOTES:

- All details shown are as per information provided.
- Confirm all Public Drains
- Based on design drawings provided
- Confirm all details when "As Built" complete.
- The building platform has been prepared to an advised level of RL: 23.20
- CONFIRM ON SITE
- Proposed FL of 23.35
- Refer to page 2 for specific details of plumbing and drainage.

## TOTAL SITE LEGAL DESCRIPTION

LOT: 2  
DP: 339810  
AREA: 4.9336 ha

This proposed site is Lot 32 of a subdivision of the above.

AREA: 349m<sup>2</sup>  
SITE COVERAGES:  
Building: 99m<sup>2</sup> = 28.3%  
Impermeable: 58.8m<sup>2</sup> = 16.8%  
Grass/Landscaped: 191.2m<sup>2</sup> = 54.9%

SITE LEVEL - ADVISED AS 23.20  
VERIFY BEFORE COMMENCING

new 15mm water meter  
by council's contractor  
200mm within the boundary  
location of WATER METER  
as per Salsalago Eng 7803

WIND ZONE: HIGH  
DURABILITY ZONE 1

SITE DATUM: SW MHC6 LL: 23.40

WIND ZONE LOW  
SEASPRAY ZONE N/A

## PLANS AND SPECIFICATIONS

APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
SIGNED 16 OCT 2009 DATE 16 OCT 2009  
AUTHORISED OFFICER

Site Plan - Lot 32  
Scale: 1:100

Job Type 5a - Lot 32 - 19 TITCH PLACE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 09/09	
Page Scale 1:100	
Drawn By BENNETT DRAUGHTING 116 RED HILL ROAD PAPAKURA ph: (09) 296 6369	
Page No 1	Total Pages 21

SWMH C6  
Depth: 3.30  
IL: 20.10  
LL: 23.40

run 100a  
up on wall up  
to pump

100a

run 100a PVC stormwater line to connection

CP

run 100a UPVC sewer line to connection

drain to drain  
confirm on site

hand basin  
40a

WC  
80a SP

shwr  
40a

tub  
40a

# **PLUMBING FIXTURES TO NZBC G13/AS1.** Waste Size & Minimum Falls Required.

Fixture	Size	Min Fall
WC	80a SP	1:60
Bath	40a	1:40
Shower	40a	1:40
Hand Basin	32a	1:20
K Sink	40a	1:40
Tub	40a	1:40

100a combined & vented to upper level.

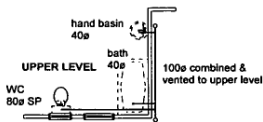
ALL DP's TO BE 80a

MIN SW FALL: 1:90

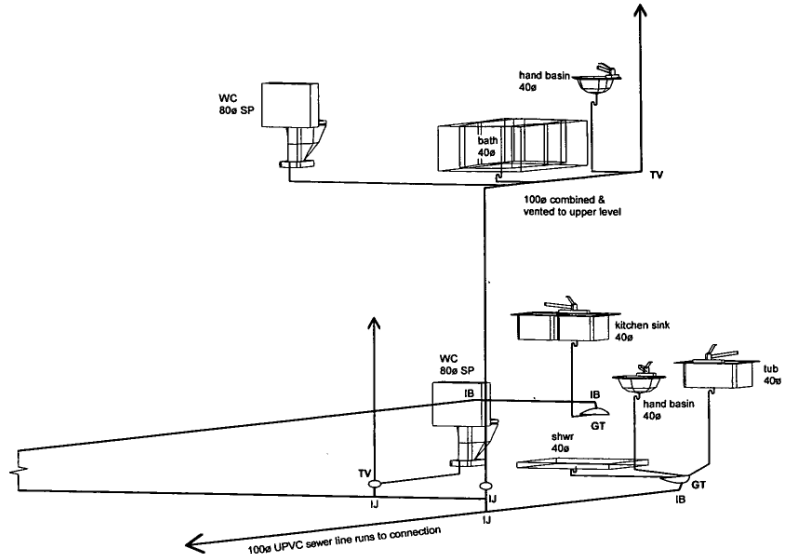
MIN SS FALL: 1:60

DRAINLAYER MUST PROVIDE AN "AS BUILT"  
OF ALL DRAINS ON COMPLETION.

SSMH 3C  
Depth: 1.13  
IL: 22.22  
LL: 23.35



**2 Drainage**  
Scale: 1:100



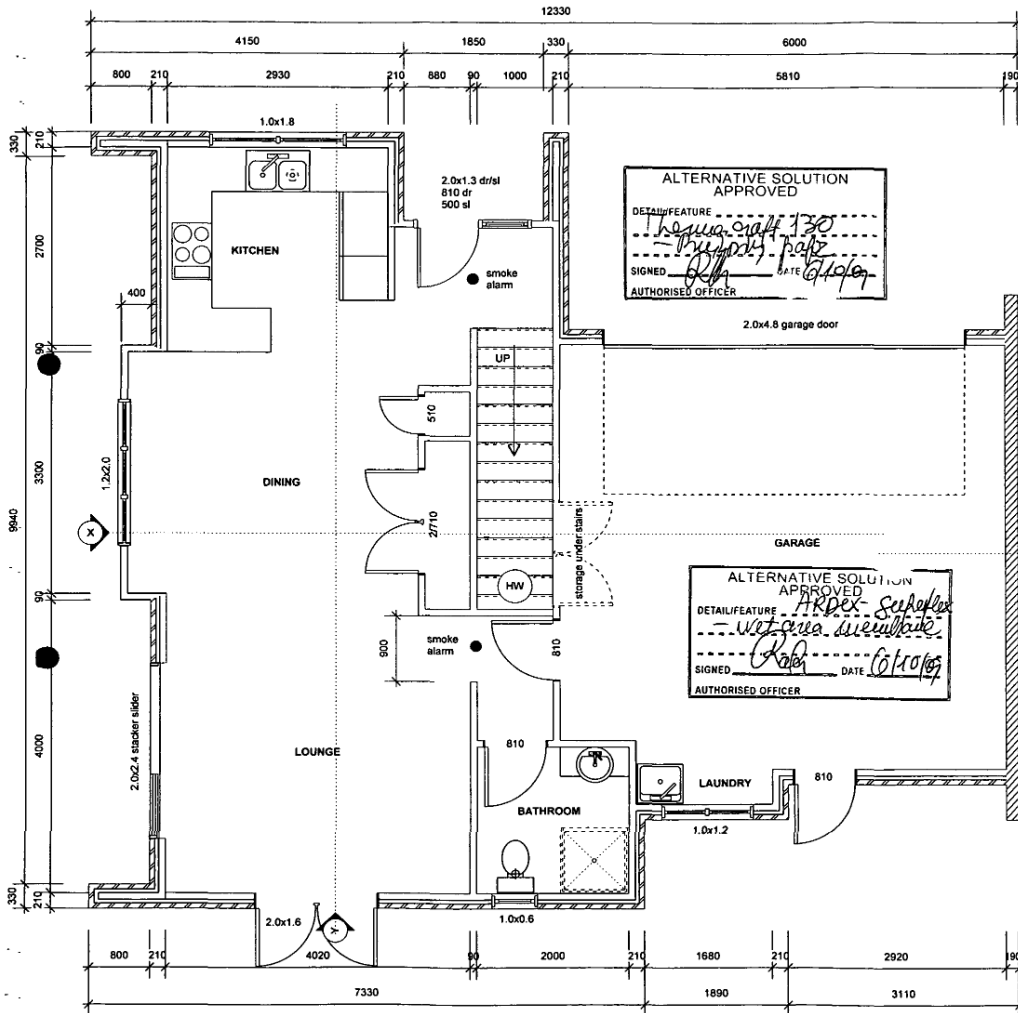
**2a Schematic**  
Plumbing to NZBC G13

## **NOTES:**

- All details shown are as per information provided by NZHF.
- Confirm all public drains & connections on site before commencing any work.
- Public drains & connections plotted as per Babbage "As Built" dwgs: AB08 & AB09
- The building platform has been prepared to an advised level of RL: 23.20
- A FL: 23.35 is proposed for the new dwelling.
- CONFIRM RL ON SITE BEFORE COMMENCING.

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
SIGNED 6 OCT 2009 DATE  
AUTHORISED OFFICER

Job TYPE 5a - LOT 32 - 19 TITCH PLACE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 09/09	
Page Scale 1:100	
Drawn By BENNETT DRAUGHTING 116 RED HILL ROAD PAPAKURA ph: (09) 296 6369	
Page No 2	Total Pages 21



ALTERNATIVE SOLUTION  
APPROVED

DETAIL/FEATURE  
Thermokraft 130  
Thermokraft 130  
SIGNED *[Signature]* DATE 6/10/09  
AUTHORISED OFFICER

ALTERNATIVE SOLUTION  
APPROVED

DETAIL/FEATURE  
Thermokraft 130  
Thermokraft 130  
SIGNED *[Signature]* DATE 6/10/09  
AUTHORISED OFFICER

# FLOOR NOTES:

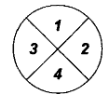
- All work must comply with the NZ Building Code & approved documents in NZS 3604:1999.
- Kitchen facilities to NZBC G3
- Laundry Facilities to NZBC G2
- All "wet" areas must comply with NZBC E3
- Safety glass to Bathrooms & WC to NZBC F2
- Seismic Strapping & Tempering valve to NZBC G12
- Equipotential Bonding to NZBC G.12
- Framing & Linets to NZS 3604 - High Wind Zone.
- Linets & beams outside NZS 3604 are sized ex the Gangnail Charts - see spec.
- ALL STRUCTURAL TIMBER MUST BE MSG8 MIN GRADE
- Exterior Loadbearing Studs in Lower Level must be at 480 cts
- Other Loadbearing Studs -
- 90x45 @ 600 cts - nogs @ 800 cts
- 90x45 top & bottom plates to NZS 3604
- 140x25 over all top plates
- Non Loadbearing Studs -
- 90x45 or 70x45 @ 600 cts - nogs @ 800 cts
- 90x45 or 70x45 top & bottom plates to NZS 3604
- 140x25 over all top plates
- All timber must comply with NZBC B2 - All framing to walls, ceiling & roof to be H-1.2 min with H-3.1 bottom plates. (note: use H-3.1 in all wet areas).
- Ground Floor cladding will be 70 Series Brick Veneer with 40mm cavity to E2/AS1.
- Top Floor cladding will be Palisade Weatherboards on a cavity system to E2/AS1.
- "Thermokraft Diffex 130" building paper, fixed with staples to manufacturers details.
- Provide domestic smoke alarms to comply with the NZBC.
- Refer to specific layout for bracing & linet information.
- Refer to page 8 for insulation calls - H1/A51 - Schedule Method.
- CHECK ALL DIMENSIONS, LEVELS & DETAILS ON SITE.

PLANS AND SPECIFICATIONS  
APPROVED

SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT

SIGNED *[Signature]* DATE 16 OCT 2009  
AUTHORISED OFFICER

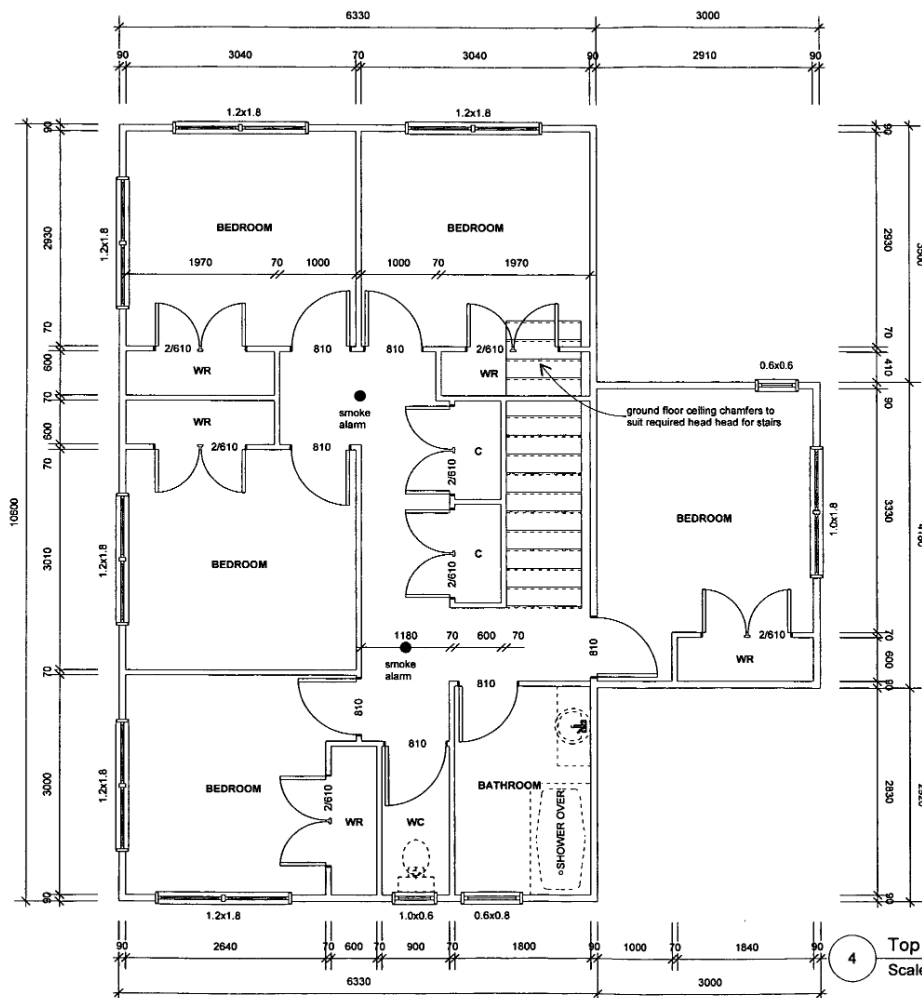
Ground Floor Area: 99m<sup>2</sup>  
Top Floor Area: 83m<sup>2</sup>  
Total Floor Area: 180m<sup>2</sup>



ELEVATIONS

<b>Job</b> TYPE 5a HOUSE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
<b>Builder</b> GOLDSMITH DEVELOPMENTS LTD	
<b>Date</b> 09/09	
<b>Page Scale</b> 1:50	
<b>Drawn By</b> BENNETT DRAUGHTING 116 RED HILL ROAD PAKAPURA ph: (09) 296 6369	
<b>Page No</b> 3	<b>Total Pages</b> 21

3 Ground Floor  
Scale: 1:50



- FLOOR NOTES:**
- All work must comply with the NZ Building Code & approved documents including NZS 3604:1999.
  - Kitchen facilities to NZBC G3
  - Laundry Facilities to NZBC G2
  - All "wet" areas must comply with NZBC E3
  - Safety glass to Bathrooms & WC to NZBC F2
  - Seismic Strapping & Tapering valve to NZBC G12
  - Equipotential Bonding to NZBC G.12
  - Framing & Lintels to NZS 3604 - High Wind Zone.
  - Lintels & beams outside NZS 3604 are sized ex the Gannall Charts - see spec.
  - ALL STRUCTURAL TIMBER MUST BE MSG8 MIN GRADE**
  - Exterior Loadbearing Studs in Lower Level must be at 480 cts
  - Other Loadbearing Studs -
    - 90x45 @ 600 cts - nogs @ 800 cts
    - 90x45 top & bottom plates to NZS 3604
    - 140x35 over all top plates
  - Non Loadbearing Studs -
    - 60x45 or 70x45 @ 600 cts - nogs @ 800 cts
    - 90x45 or 70x45 top & bottom plates to NZS 3604
    - 140x35 over all top plates
  - All timber must comply with NZBC B2 - All framing to walls, ceiling & roof to be H-1.2 min with H-3.1 bottom plates. (note: use H-3.1 in all wet areas).
  - Ground Floor cladding will be 70 Series Brick Veneer with 40mm cavity to E2/AS1.
  - Top Floor cladding will be Palisade Weatherboards on a cavity system to E2/AS1.
  - Thermokraft Dilex 130" building paper, fixed with staples to manufacturers details.
  - Provide domestic smoke alarms to comply with the NZBC.
  - Refer to specific layout for bracing & lintel information.
  - Refer to page 8 for insulation calcs - H1/AS1 - Schedule Method.
  - CHECK ALL DIMENSIONS, LEVELS & DETAILS ON SITE.

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
16 OCT 2009  
SIGNED \_\_\_\_\_ DATE \_\_\_\_\_  
AUTHORISED OFFICER

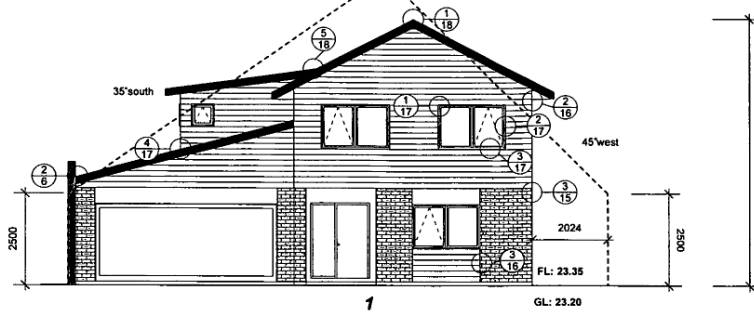
Ground Floor Area: 99m<sup>2</sup>  
Top Floor Area: 83m<sup>2</sup>  
Total Floor Area: 180m<sup>2</sup>



ELEVATIONS

<b>Job</b>	TYPE 5a HOUSE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT
<b>Builder</b>	GOLDSMITH DEVELOPMENTS LTD
<b>Date</b>	09/09
<b>Page Scale</b>	1:50
<b>Drawn By</b>	BENNETT DRAUGHTING 116 RED HILL ROAD PAPAKURA ph: (09) 296 6369
<b>Page No</b>	4
<b>Total Pages</b>	21

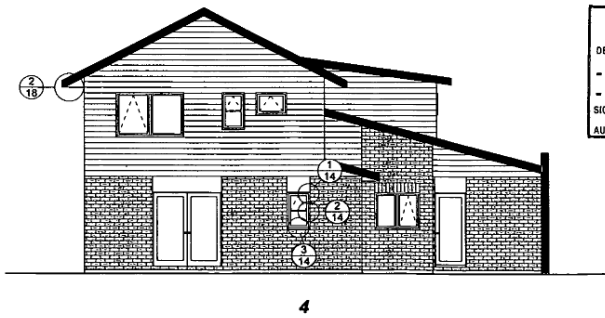
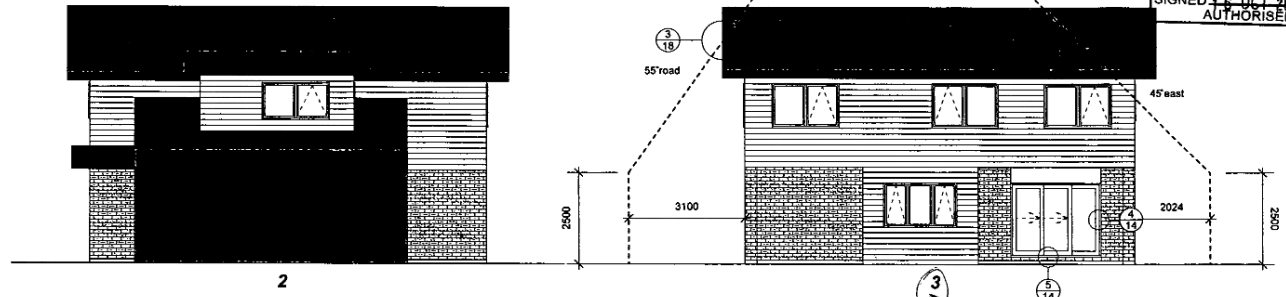
4 Top Floor  
Scale: 1:50



- 28 upper roof pitch.
- 15 & 8° lower roof pitch.
- Coloursteel Longrun roofing.
- Lower cladding - 70 Series Brick Veneer.
- Upper cladding - Pallside Weatherboards.

ALL SITES HAVE BEEN BENCHMARKED TO THE RL STATED (23.20).  
ALL HIRB REFERENCES ARE AS PER THE RESOURCE CONSENT,  
A COPY OF THIS IS ATTACHED WITH THE APPLICATION.

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
SIGNED 16 OCT 2009 DATE  
AUTHORISED OFFICER



ALTERNATIVE SOLUTION  
DETAIL/FEATURE: all side weatherboards  
SIGNED [Signature] DATE 6/10/09  
AUTHORISED OFFICER

<b>Job</b> TYPE 5a HOUSE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
<b>Builder</b> GOLDSMITH DEVELOPMENTS LTD	
<b>Date</b> 09/09	
<b>Page Scale</b> 1:100	
<b>Drawn By</b> <b>BENNETT DRAUGHTING</b> 116 RED HILL ROAD PAPAKURA ph: (09) 296 6369	
<b>Page No</b> 5	<b>Total Pages</b> 21

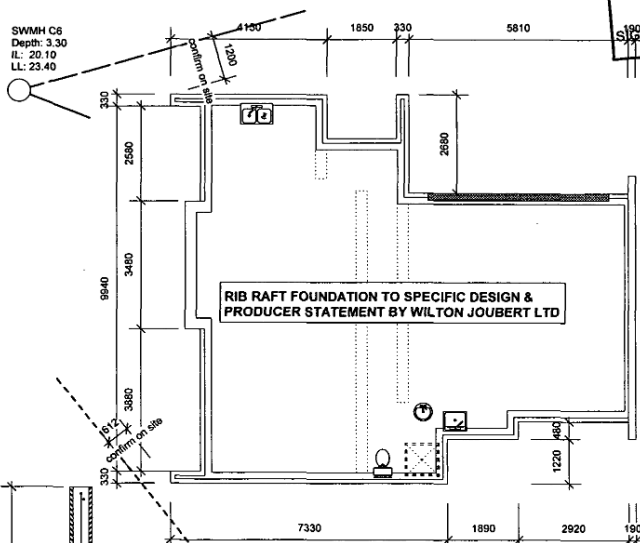


5 Elevations  
Scale: 1:100

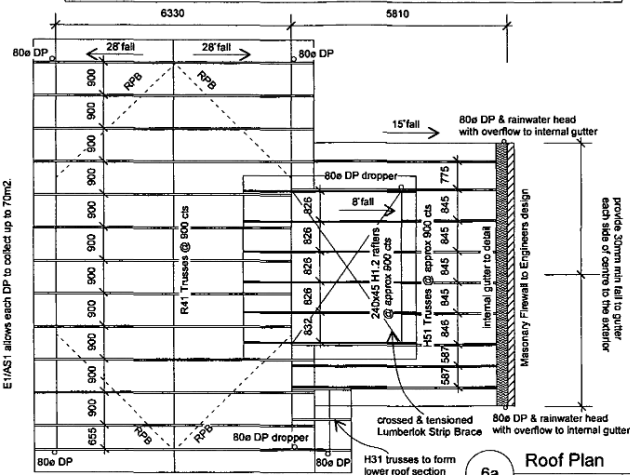
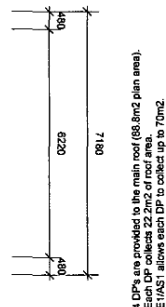
- All ground is assumed to be "good ground" to NZS 3604.1999.
- If any variations occur or unusual conditions are encountered consult Wilton Joubert Ltd immediately.
- All concrete must be 20 MPA min.
- 0.25 MU polythene to underside of slab.
- Confirm all levels, setout dimensions etc on site before commencing.
- **Foundation to specific design & producer statement by Wilton Joubert Ltd**

SIGNED 16 OCT 2009 DATE             
AUTHORISED OFFICER                                 

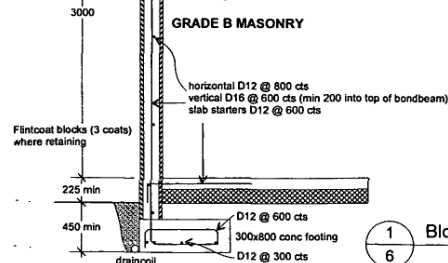
- Lower Roof - 15'pitch. Colourset Composite Profile fixed strictly to manufacturers specs & E2IAS1
- Upper Roof - 28'pitch. Colourset Composite Profile fixed strictly to manufacturers specs & E2IAS1
- Dormer Roof - 8'pitch. 200x50 rafters. Colourset Composite Profile fixed strictly to manufacturers specs & E2IAS1
- Gangna/Maxx truss system - all trusses @ 900 max cts.
- 70x25 H41 purlins @ 900 cts
- Thermekraft 215 self supporting roofing underlay.
- All trusses must be constructed by an approved fabricator who must confirm all designs.
- The fabricator must provide a Producer Statement covering all trusses & fixings.
- Any changes to this layout will require a reassessment of affected Beams & Lintels.
- All structural timber must be MS608 min grade.
- Truss Fixings: - Subject to verification by fabricator.
- To Plate - 2 wire dogs each end.
- To Truss - L.L. Joist bit.
- Roof Bracing to NZS 3604 - "Light Gable".



6 Foundation Layout  
Scale: 1:100

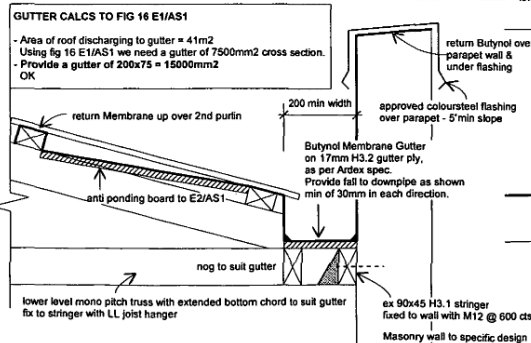


6a Roof Plan  
Scale: 1:100



**2 Internal Gutter Detail**  
**6 ALSO REFER TO PAGE 19 FOR RAINWATER HEAD & LAPPING DETAILS**

1 Blockwall Detail



**Job**  
TYPE 5a HOUSE  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

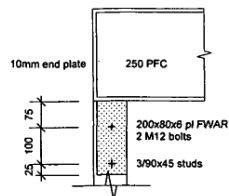
**Builder**  
GOLDSMITH DEVELOPMENTS LTD

Date  
09/09Page Scale  
1:100

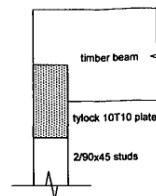
**Drawn By**  
**BENNETT DRAUGHTING**  
116 RED HILL ROAD  
PAPAKURA  
ph: (09) 296 6369

Page No 6	Total Pages 71
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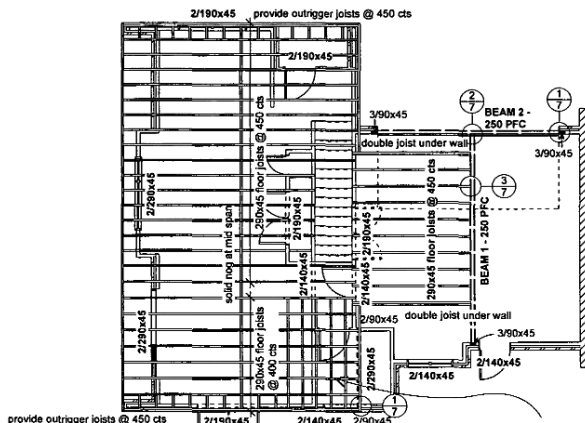
- All floor joists 290x45 @ 450 cts.
- Solid nog all joists to NZS 3604.1999.
- All structural timber to be MSG8 min grade.
- JOISTS MUST BE 290x45 MSG8 TO SUIT CANTILEVER (1.0 max to NZS 3604)
- Use H-1.2 joists throughout with H-3.1 joists in "Wet Areas".
- Use H-3 ply flooring in "Wet Areas".



1 Steel Beam / Timber Post Detail

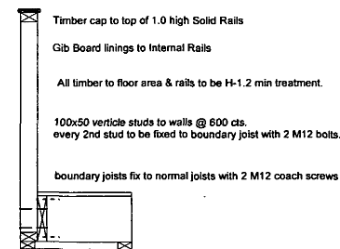


① Timber Beam / Timber Post Detail

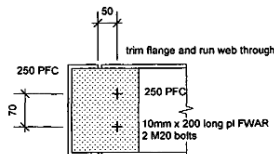


Plywood must be a minimum of 17mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 (CCA treated).  
LOSP treated plywood must not be used.

The plywood must be supported with nogs or joists with a maximum span of 400mm in each direction, fixed with 10g x 50mm stainless steel countersunk head screws at 150mm c/s on the edges & 200mm through the body of the sheets.



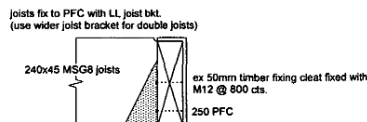
### Internal rail detail



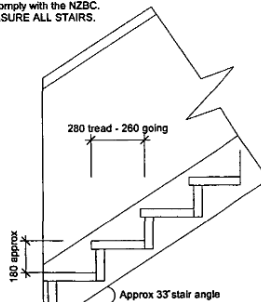
2 Steel Beam / Steel Beam Detail

graspable handrail to comply with the NZBC & D1/AS1.  
Packed 50mm off wall, 1000 high ex stair nosing.

Stairs to comply with the NZBC.  
SITE MEASURE ALL STAIRS.



3 Floor Joist / Steel Beam



### Internal Stairs Detail

7

### Mid Floor

Scale: 1:100

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
SIGNED 16 OCT 2009 DATE  
AUTHORISED OFFICER

**Job**  
TYPE 5a HOUSE  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

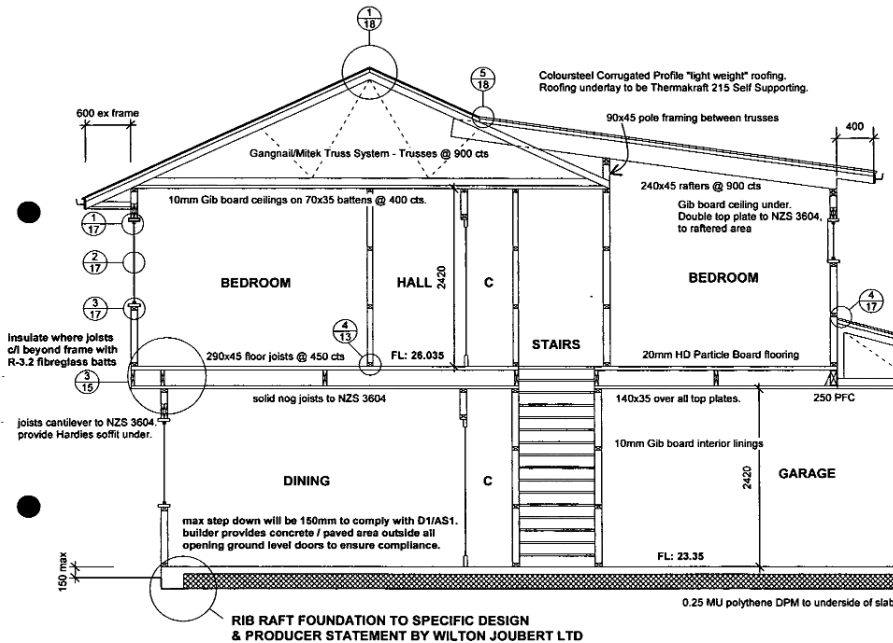
**Builder**  
GOLDSMITH DEVELOPMENTS LTD

**Date**  
09/09

**Page Scale**  
1:100

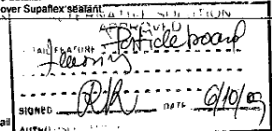
**Drawn By**  
**BENNETT DRAUGHTING**  
116 RED HILL ROAD  
PAPAKURA  
ph: (09) 296 6369

Page No	7	Total Pages	21
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# **X SECTION NOTES:**

- Lower Roof - 15° pitch. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Upper Roof - 28° pitch. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Dormer Roof - 6° pitch. 250x40 rafters. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Gangnail / Mitak trusses @ 900.
- Design no. R41
- 70x45 purlins @ 900 max cts.
- External fascia / gutter.
- Hardies soffit.
- Ground Floor cladding will be 70 Series Brick Veneer with 40mm cavity to E2/AS1.
- Top Floor cladding will be Palside Weatherboards on a cavity system to manufacturers spec & E2/AS1.
- Approved building paper to E2/AS1.
- All framing to NZS 3604.1999.
- MSGS framing is to be used throughout.
- All load bearing exterior walls in the lower level require studs @ 480 max cts.
- Loadbearing Studs - 90x45 @ 600 cts
- 90x45 top & bottom plates to NZS 3604
- 140x35 over all top plates
- Non Loadbearing Studs - 90x45 or 70x45 @ 600 cts.
- nogs @ 800 cts
- 90x45 or 70x45 top & bottom plates to NZS 3604
- 140x35 over all top plates
- All timber to B2/AS1
- Use H-1.2 treated timber for all wall, truss and roof framing.
- (Use H-3.1 in wet areas & to all Bottom Plates).
- Refer to elevations for GE claddings.
- Wet Area Details.
- Refer to sheet 20 for standard Gib Wet Area details
- All wall & ceiling linings in "wet" rooms to Aqualine details.
- All "wet" room floor coverings to be vinyl flooring over Supaflex substrate



**PLANS AND SPECIFICATIONS**  
**APPROVED**  
**SUBJECT TO CONDITIONS ENDORSED**  
**ON BUILDING CONSENT**  
**16 OCT 2009**  
**SIGNED [Signature] DATE 16 OCT 2009**  
**AUTHORIZED OFFICER**

**Job**  
**TYPE 5a HOUSE**  
**NEW ZEALAND HOUSING FOUNDATION**  
**WEST COAST ROAD DEVELOPMENT**

**Builder**  
**GOLDSMITH DEVELOPMENTS LTD**

**Date**  
**09/09**

**Page Scale**  
**1:50**

**Drawn By**  
**BENNETT DRAUGHTING**  
**116 RED HILL ROAD**  
**PAPAKURA**  
**ph: (09) 296 6369**

**Page No** **8** **Total Pages** **21**

**H1 Energy Efficiency**  
**Insulation to comply with H1/AS1 - Zone 2**  
**See full calcs in specification.**  
**Required "R" values - Zone 2**

Ceiling / Roof = R-2.9  
 Exterior Walls = R-1.9  
 Floor = R-1.3  
 Vertical Glazing = R-0.26  
 Wall separating garage / dwelling = R-1.9

## **Vertical Glazing Requirement.**

(lower level - garage walls excluded from calcs)

East / West / South = 37.37m<sup>2</sup> / 8.2m<sup>2</sup> glazing = 21.9%  
 North = 25.07m<sup>2</sup> / 7.2m<sup>2</sup> glazing = 28.7%  
 Total including North = 62.44m<sup>2</sup> / 15.4m<sup>2</sup> = 24.6%

(upper level)

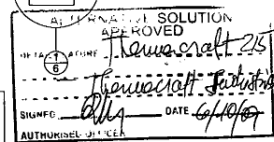
East / West / South = 70.79m<sup>2</sup> / 9.72m<sup>2</sup> glazing = 13.7%  
 North = 25.65m<sup>2</sup> / 6.48 glazing = 25.2%  
 Total including North = 96.44m<sup>2</sup> / 16.2 glazing = 16.7%

## **Upper & Lower Total**

East / West / South = 110.16m<sup>2</sup> / 17.92 glazing = 18.2%  
 North = 50.72m<sup>2</sup> / 13.68 glazing = 26.0%  
 Total including North = 160.88m<sup>2</sup> / 31.60 glazing = 19.64%

**As glazing is under 30% use Schedule Method.**  
**(R values as per Pink Batts R value installation guide)**

Ceilings / Roof = R-3.2 batts  
 Exterior Walls = R-2.6 batts  
 Floor = R-1.3  
 Vertical Glazing = R-0.26 (use double glazing)



8

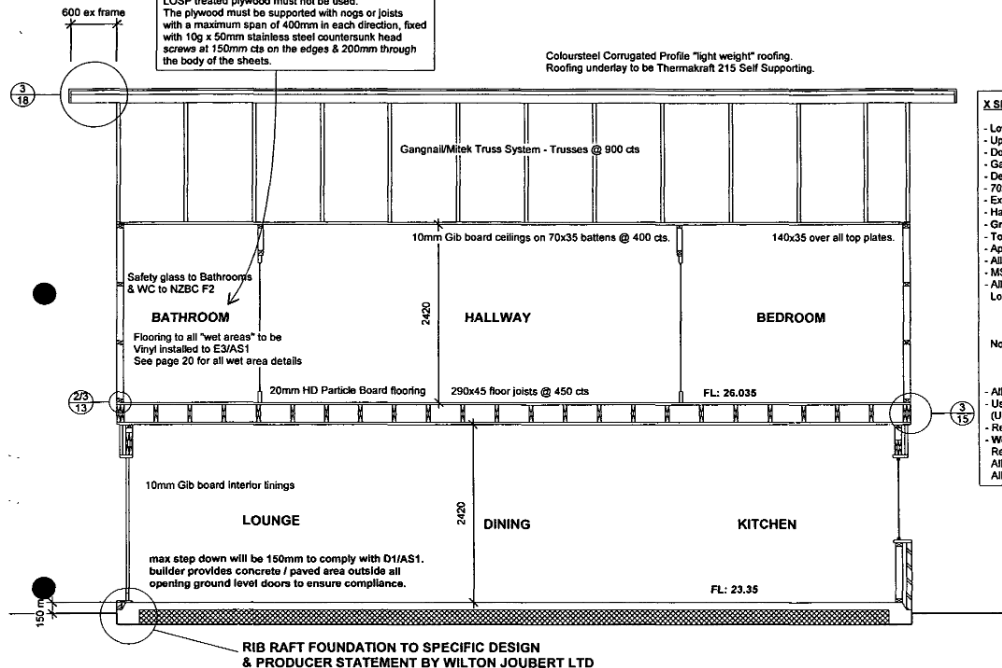
**X Section**

**Scale: 1:50**

# WET AREA FLOOR FRAMING:

Plywood must be a minimum of 17mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 (CCA treated).  
LOSP treated plywood must not be used.  
The plywood must be supported with noggs or joists with a maximum span of 400mm in each direction, fixed with 10g x 50mm stainless steel countersunk head screws at 150mm cts on the edges & 200mm through the body of the sheets.

Coloursteel Corrugated Profile "light weight" roofing.  
Roofing underlay to be Thermakraft 215 Self Supporting.



## X SECTION NOTES:

- Lower Roof - 15° pitch. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Upper Roof - 28° pitch. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Dormer Roof - 8° pitch. 250x50 rafters. Coloursteel Corrugated Profile fixed strictly to manufacturers specs & E2/AS1
- Gangnall / Mitek trusses @ 900.
- Design no. R41
- 70x45 purlins @ 900 max cts.
- External fascia / gutter.
- Hardies soffit.
- Ground Floor cladding will be 70 Series Brick Veneer with 40mm cavity to E2/AS1.
- Top Floor cladding will be Palisade Weatherboards on a cavity system to manufacturers spec & E2/AS1.
- Approved building paper to E2/AS1.
- All framing to NZS 3604.1599.
- MSGS framing is to be used throughout.
- All load bearing exterior walls in the lower level require studs @ 480 max cts.
- Loadbearing Studs -
  - 90x45 @ 600 cts
  - nogs @ 800 cts
  - 90x45 top & bottom plates to NZS 3604
  - 140x35 over all top plates
- Non Loadbearing Studs -
  - 90x45 or 70x45 @ 600 cts.
  - nogs @ 800 cts
  - 90x45 or 70x45 top & bottom plates to NZS 3604
  - 140x35 over all top plates
- All timber to E2/AS1
- Use H-1.2 treated timber for all wall, truss and roof framing.
- (Use H-3.1 in wet areas & to all Bottom Plates).
- Refer to elevations for GE claddings.
- Wet Area Details.
- Refer to sheet 20 for standard Gib Wet Area details
- All wall & ceiling linings in "wet" rooms to Aqualine details.
- All "wet" room floor coverings to be vinyl flooring over Supaflex sealant.

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
SIGNED 16 OCT 2009 DATE  
AUTHORISED OFFICER

Job  
TYPE 5a HOUSE  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

Builder  
GOLDSMITH DEVELOPMENTS LTD

Date  
09/09

Page Scale  
1:50

Drawn By  
BENNETT DRAUGHTING  
116 RED HILL ROAD  
PAPAKURA  
ph: (09) 296 6369

Page No 9 Total Pages 21

H1 Energy Efficiency  
Insulation to comply with H1/AS1 - Zone 2  
See full calcs in specification  
Required "R" values - Zone 2

Ceiling / Roof = R-2.9  
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Wall separating garage / dwelling = R-1.9

## Vertical Glazing Requirement.

(lower level - garage walls excluded from calcs)

East / West / South = 37.37m<sup>2</sup> / 8.2m<sup>2</sup> glazing = 21.9%  
North = 25.07m<sup>2</sup> / 7.2m<sup>2</sup> glazing = 28.7%  
Total including North = 62.44m<sup>2</sup> / 15.4m<sup>2</sup> = 24.6%

(upper level)

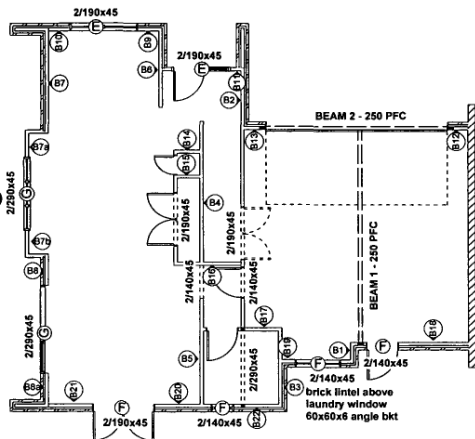
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North = 25.65m<sup>2</sup> / 6.48 glazing = 25.2%  
Total including North = 96.44m<sup>2</sup> / 16.2 glazing = 16.7%

Upper & Lower Total  
East / West / South = 110.16m<sup>2</sup> / 17.92 glazing = 16.2%  
North = 50.72m<sup>2</sup> / 13.68 glazing = 26.9%  
Total including North = 160.88m<sup>2</sup> / 31.60 glazing = 19.64%

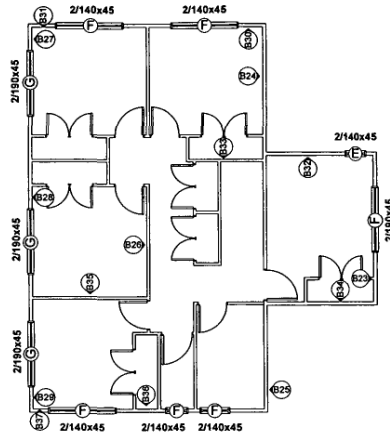
As glazing is under 30% use Schedule Method.  
(R values as per Pink Batts R value installation guide)  
Ceilings / Roof = R-3.2 batts  
Exterior Walls = R-2.6 batts  
Floor = R-1.3  
Vertical Glazing = R-0.26 (use double glazing)

9

Y Section  
Scale: 1:50



GROUND LEVEL ALONG	GROUND LEVEL ACROSS
A MASONRY WALL (Engineer design)	L B9 BLP 0.6 B10 BLP 0.6 B11 BL1 0.4
B B1 BL1 0.48	M B12 BLP 0.6 B13 BLP 0.6 B14 BLG 0.6 B15 BLG 0.6
C B2 BLP 1.6 B3 SP1 1.2 B4 BLG 3.6	N B16 BL1a 1.8 B17 BL1 1.0
D B5 GS1a 2.4 B6 BL1a 1.8	O B18 BLP 1.8 B19 BL1 0.4
E B7 BLP 2.7 B7a BL1 0.6 B7b BL1 0.6 B8 BLP 0.6 B8a BLP 0.6	P B20 BLP 1.2 B21 BLP 1.2 B22 SP1 1.2



UPPER LEVEL ALONG	UPPER LEVEL ACROSS
A B23 BL1 1.4	L B30 BL1 0.6 B31 BL1 0.6
B B24 GS1a 2.4 B25 SP1 1.2	M B32 GS1a 1.8 B33 GS1a 1.8
C B26 GS2 3.0	N B34 BL1 1.8 B35 GS2 2.4
D B27 BL1 0.6 B28 BL1 0.6 B29 BL1 0.6	O B36 BL1 0.6 B37 BL1 0.4

#### TIMBER:

- All timber must comply with B2/AS1.
- Framing - All framing must be treated to H-1.2 min with H-3.1 bottom plates.  
"Vel" areas to have H-3.1 framing.
- Exterior Use Timber - All exterior use timber (decks etc) must be treated to H-3.2 min treatment.
- Ground Contact Timber - Timber in ground contact must be treated to H-5 min.

#### FIXINGS:

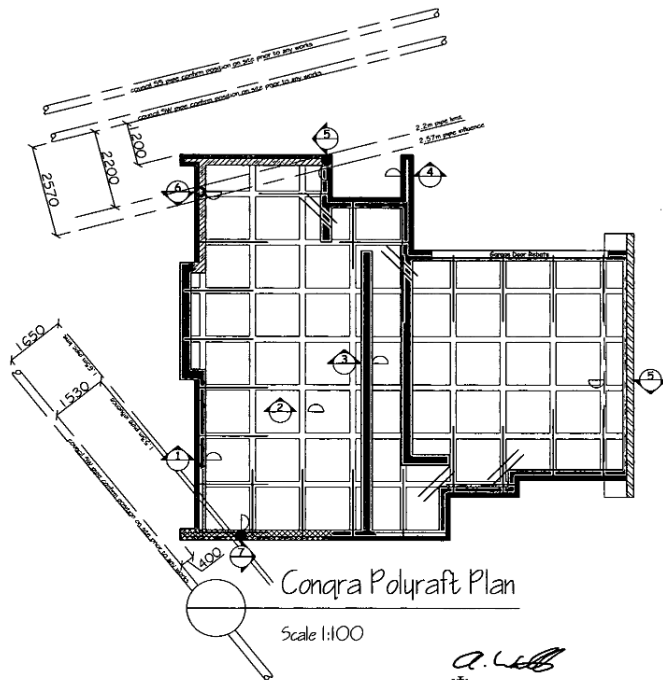
- Purlin/Truss - Min of 2 - 100x3.75 nails & 1 wire dog.
- Truss/Plate - Min of 2 wire dogs each end  
Fabricator must confirm.
- Top Plate/Stud - As noted refer to Lumberlok schedule (ALL TYPE C)
- Lintel Fixings - As noted refer to Lumberlok schedule (TYPE E or F or G)

- All lintels must be MSG8 min grade.
- Refer to supplementary sheet for bracing details
- Lintels sized ex NZS 3804:1999
- Beams 1 - 2 to specific design by Engineer

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
18 OCT 2009  
SIGNED \_\_\_\_\_ DATE \_\_\_\_\_  
AUTHORISED OFFICER

<b>Job</b> TYPE 5a HOUSE NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
<b>Builder</b> GOLDSMITH DEVELOPMENTS LTD	
<b>Date</b> 09/09	
<b>Page Scale</b> 1:100	
<b>Drawn By</b> <b>BENNETT DRAUGHTING</b> 116 RED HILL ROAD PAPAKURA ph: (09) 296 6369	
<b>Page No</b> 10	<b>Total Pages</b> 21

PLANS AND SPECIFICATIONS	
APPROVED	
SUBJECT TO CONDITIONS ENDORSED	
ON BUILDING CONSENT	
SIGNER	DATE 16 OCT 2009
AUTHORISED OFFICER	



Congra Polyrast Plan

Scale 1:100

*A. L. L.*

- Re External corner steel  
250D12 @ 1200mm  
at 200 c/s
- 150D12 @ 1350mm  
1.85m long then  
bent 120mm  
into edge beam
- 3000 Bored Concrete Pile:  
250D12 placed centrally,  
min. 4.0m into good natural ground  
or 1.5m below invert level  
whichever depth is greater.
- 3000 Bored Concrete Pile:  
250D12 placed centrally,  
min. 1.5m into good natural ground  
or 1.5m below invert level  
whichever depth is greater.
- 300W x 300D  
edge beam  
250D12 along
- 300W x 400D  
edge beam  
250D12 along  
Re @ 170cc
- 300W x 300D  
edge beam  
250D12 along  
Re @ 120cc

# NOTE:

Building platform shall be tested to ensure availability of min. 100kPa dependable bearing capacity

It is increasingly common for building consent authorities to require a "PS4" for specifically designed structures. For Wilton Joubert Ltd. to issue this, we need to inspect prior to concrete pour. Ring 09 579 1114 to arrange a booking. A local, qualified engineer may also be engaged to carry out the inspection & issue a PS4 subsequently

NO INSPECTION EQUALS  
NO PS4 ISSUED.

Congra Polyrast	
Drawn	##
Check	

## NOTES:

Only Congra polystyrene pods and RG galvanised spacers to be used for this design. Under no circumstances shall polystyrene spacers be used. Where underfloor heating is installed, floor topping shall be increased to 120mm. Unless otherwise noted; All Concrete strength shall be minimum 25MPa in sea spray zone, 20MPa elsewhere (if in doubt check with local T.A.) Do not scale from Drawings. Refer Architectural Drawings for overall dimensions.

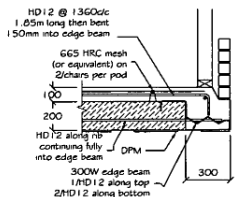
Revision	Description	Date
2	total redesign	24-7-09

Structural Engineer:  
**WILTON JOUBERT Ltd**  
P.O. BOX 11-381  
ELLERSLIE  
AUCKLAND  
Ph (09) 579 1114  
Fax (09) 579 7778

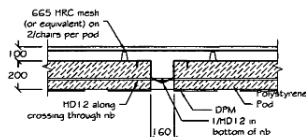
Job Title:  
Proposed Residence  
lot 32 of  
Lot 2 : DP 339810  
19 Titch Place

Sheet Title:  
Congra Polyrast  
Plan

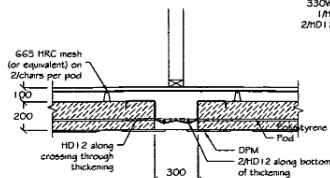
Drawn	BR	Check	TE
Scale	DL	Date	
Scale	1:100	Date	19-05-08
JOB # WJ15193			Sheet
17/15 in revision 2			S1



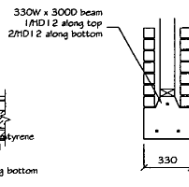
1 Detail  
Congra Polyraft  
Perimeter Beam 300  
Scale 1:25



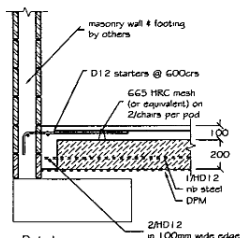
2 Detail  
Congra Polyraft  
Internal Beam 160  
Scale 1:25



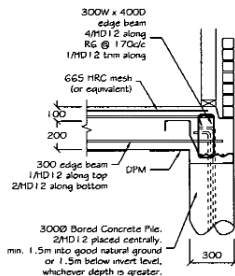
3 Detail  
Congra Polyraft  
Internal Beam 300  
Scale 1:25



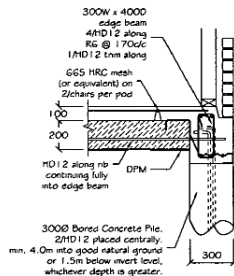
4 Detail  
Wingwall Beam - 330  
Scale 1:25



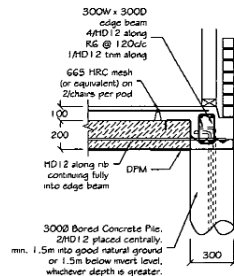
5 Detail  
Raftfloor to Wall  
Scale 1:25



6 Detail  
Raftfloor Edge Beam - 300  
on 3000 BCP  
Scale 1:25



7 Detail  
Raftfloor Edge Beam - 300  
on 3000 BCP  
Scale 1:25



8 Detail  
Raftfloor Edge Beam - 300  
on 3000 BCP  
Scale 1:25

*A. L. L.*

Congra Polyraft

##

## NOTES:

Only Congra polystyrene pods and RG galvanised spacers to be used for this design.

Under no circumstances shall polystyrene spacers be used.

Where underfloor heating is installed, floor topping shall be increased to 120mm.

Unless otherwise noted, All Concrete strength shall be minimum 25MPa in sea spray zone, 20MPa elsewhere (if in doubt check with local T.A.)

Do not scale from Drawings. Refer Architectural Drawings for overall dimensions.

Revision	Description	Date
2	total release	24-7-09

Standard Envelope  
WILTON JOUBERT Ltd  
P.O. BOX 11-381  
ELLERSLIE  
AUCKLAND

Ph (09) 579 1114  
Fax (09) 579 7778

Job Title  
Proposed Residence  
Lot 52 of  
Lot 2 : DP 359810  
19 Titch Place

Sheet Title  
Congra Polyraft  
Details

PLANNING AND SPECIFICATIONS  
REVISED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
16 OCT 2009  
SIGNED DATE  
AUTHORISED OFFICER

Drawn	BR	Rev	TE
Checked	DL		
Date	1-25	Date	19-05-08
Job #	W315193		
17710 in revision 2			S2

WHEEL  
Q231



...the ... ..



Pink® Batts® R-value Insulation Guidelines for Small Buildings (Wall Framing)

(These guidelines are only applicable if read in conjunction with the NOTES)

Wall Cladding Details		Zone 1 & 2 (Minimum Construction R-value = R 1.9)	Zone 3 (Minimum Construction R-value = R 2.0)
Brick	Masonry Veneer	R 2.5	R 2.8
Weatherboard	Bowl Back Rusticated Fibre Cement (direct fixed only)	R 2.5	R 2.8
Monolithic	Stucco with Rigid Backing (cavity only)	R 2.8	R 2.8
	EIPS Direct fixed and Cavity	R 1.8*	R 1.8*
Metal	Vertical Profile (direct fixed only) Horizontal Profile (cavity only)	R 2.5	R 2.8
Sheet Cladding	Non Metal (direct fixed only)	R 2.8	R 2.8

**NOTES**

These insulation guidelines take into consideration Timber Framed Building designs (NZS 3604) and their respective framing spacing and cladding types to assist in meeting the minimum NZBC H1 Energy Efficiency (2007) requirements. To achieve higher performance, reference can be made to the better/best classification of PAS 4244.

This information is applicable if:

- the total glazing area is 30% or less than the total wall area,
- the sum of the glazing area is 30% or less than the external west, east and south facing wall area,
- total skylight area is less than 1.2m²,
- All residential buildings and building up to 300m²,
- non CA rated downlights used are less than 1 per 5m² of ceiling,
- insulation installed to NZS 4246.

If these criteria are not met, please consult with your building designer for Calculation and Modelling method (NZS 4218) to ensure compliance to the NZ Building Code.

The R-value guidelines determined from the Schedule Method (NZS 4218) are minimum insulation levels recommended by Tasman Insulation New Zealand to cover a range of similar framing systems. Lower levels of insulation R-value than those indicated may apply for some framing systems. We strongly recommend a detailed analysis specific to your construction is carried out by a building designer on alternative R-value solutions to the above recommendation to ensure compliance to the NZ Building Code.

\*Insulation with R 1.8 insulation will generally result in construction R-values above the minimum, as EIPS has a R-value higher than most common cladding types.

Pink® Batts® R-value Insulation Guidelines for Small Buildings (Roof Framing)

(These guidelines are only applicable if read in conjunction with the NOTES)

Roof Cladding Details		Zone 1 & 2 (Minimum Construction R-value = R 2.0)	Zone 3 (Minimum Construction R-value = R 3.0)	Zone 4 (Minimum Construction R-value = R 3.5)
Profiled Steel	Pitched	R 3.2	R 3.8*	R 4.2
	Skillion	R 3.2	R 3.6	R 3.8
	Low Slope Timber Frame	R 3.2	R 3.6	R 3.8
Concrete / Clay Tiles	Pitched	R 3.2	R 3.8*	R 4.2
	Skillion	R 3.0	R 3.4	R 3.6
	Low Slope Timber Frame	-	-	-
Membrane	Pitched	-	-	-
	Skillion	-	-	-
	Low Slope Timber Frame	R 3.0	R 3.4	R 3.8

**NOTES**

These insulation guidelines take into consideration Timber Framed Building designs (NZS 3604) and their respective framing spacing and cladding types to assist in meeting the minimum NZBC H1 Energy Efficiency (2007) requirements. To achieve higher performance, reference can be made to the better/best classification of PAS 4244.

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- the sum of the glazing area is 30% or less than the external west, east and south facing wall area,
- total skylight area is less than 1.2m²,
- All residential buildings and building up to 300m²,
- non CA rated downlights used are less than 1 per 5m² of ceiling,
- insulation installed to NZS 4246.

If these criteria are not met, please consult with your building designer for Calculation and Modelling method (NZS 4218) to ensure compliance to the NZ Building Code.

The R-value guidelines determined from the Schedule Method (NZS 4218) are minimum insulation levels recommended by Tasman Insulation New Zealand to cover a range of similar framing systems. Lower levels of insulation R-value than those indicated may apply for some framing systems. We strongly recommend a detailed analysis specific to your construction is carried out by a building designer on alternative R-value solutions to the above recommendation to ensure compliance to the NZ Building Code.

\*Insulation with R 3.8 insulation will generally result in construction R-values above the minimum, as EIPS has a R-value higher than most common cladding types.

GIB® BRACING SYSTEMS - DESIGN

Design Steps 4 and 5 - Bracing Units Achieved (Wind and Earthquake)

MARCH 2009

TABLE 1: Bracing Unit Ratings for 10mm GIB® Standard Plasterboard and any other 10mm and 12mm GIB® plasterboard.

WALL	WALL TYPE	WALL TYPE	WALL TYPE	WALL TYPE	WALL TYPE
G514	1.8	10mm GIB® Standard Plasterboard one face fixed horizontal or vertical	yes	65	55
	2.4			75	65
	1.2			70	60
G52	1.8	10mm GIB® Standard Plasterboard both sides fixed horizontal or vertical	no	80	70
	2.4			90	80

TABLE 2: Bracing Unit Ratings for 10mm GIB® Bracelina®, 10mm and 12mm GIB® Toughta® and 13mm GIB® Toughta® (fixed with GIB® Bracelina® screws or GIB® Bracelina® nails)

WALL	WALL TYPE	GIB® Bracelina®	GIB® Bracelina®		GIB® Bracelina®	
			one face fixed horizontal or vertical	one face fixed horizontal or vertical	one face fixed horizontal or vertical	one face fixed horizontal or vertical
B1	0.4	GIB® Bracelina® one face fixed horizontal or vertical	yes	yes	120	115
	0.6		yes	yes	125	115
B1a	1.2	GIB® Bracelina® one face fixed horizontal or vertical	yes	yes	130	115
	0.6		yes	yes	115	105
B1F	0.9	GIB® Bracelina® one face fixed horizontal or vertical. Two D boards on the other face	no	yes	140	145
	0.6		no	yes	145	150
B1D	1.2	GIB® Bracelina® one face, 10mm GIB® Toughta® on the other face (single fixed horizontal or vertical)	no	yes	150	130
	0.6		no	yes	155	135

**Notes:**

- Where fixings are specified on both faces, each face must be fastened as a bracing element.
- GIB® Bracelina® can be used in place of GIB® Bracelina® in bracing elements 300mm or longer, providing the perimeter of the element is fixed with GIB® Bracelina® nails or screws spaced at 100mm centres, generally using the GIB® Bracelina® corner lining pattern.
- A maximum of 150 Bracelina® is recommended for any bracing system used with NZS 3604:1999 provisions. Higher ratings generally result in the capacity of NZS 3604:1999 bracing system and also derive if ratings exceed 150 Bracelina® fasteners and fasteners must be the subject of specific structural engineering design.
- Where 13mm GIB® Toughta® or 13mm GIB® Toughta® is used in place of 10mm GIB® Bracelina®, it is recommended that GIB® Bracelina® nails are used.

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PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
ISSUED 16 OCT 2009  
AUTHORISED OFFICER

**Job**  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

**Builder**  
GOLDSMITH DEVELOPMENTS LTD

**Date**  
06/09

**Page**  
Page 1 of 1

**Drawn By**  
Gib Bracing / Pink Batts

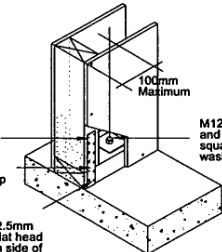
**BENNETT DRAFTING**

Page No 12  
Total Pages 21

Six 30 x 2.5mm  
galvanised flat head  
nails to each side of  
stud

400 x 25 x 0.9mm  
galvanised strap (strap  
passes underneath  
bottom plate)

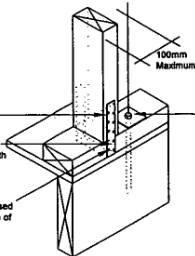
Three 30 x 2.5mm  
galvanised flat head  
nails to each side of  
bottom plate



M12 galvanised bolt  
and 50 x 50 x 3mm  
square galvanised  
washer

Six 30 x 2.5mm galvanised  
flat head nails to each side  
of stud  
400 x 25 x 0.9mm galvanised  
strap (strap passes underneath  
bottom plate)

Three 30 x 2.5mm galvanised  
flat head nails to each side of  
bottom plate



M12 x 150mm galvanised  
coach screw and 50 x 50 x  
3mm square galvanised washer

### 1 Concrete Floor - Internal / External Walls Hold Down

13 Scale: 1:10

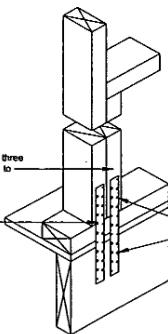
### 2 Timber Floor - External Walls Hold Down - Option 1

13 Scale: 1:10

Block to first nog fixed with three  
100 x 3.75mm nails to stud to  
accommodate double strap

Two 300 x 25 x 0.9mm  
Galvanised straps

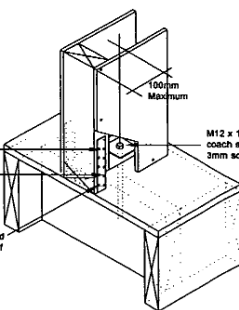
Six 30 x 2.5mm galvanised  
flat head nails to each stud  
and joist



Six 30 x 2.5mm galvanised flat  
head nails to each side of stud

400 x 25 x 0.9mm galvanised  
strap (strap passes underneath  
bottom plate)

Three 30 x 2.5mm galvanised  
flat head nails to each side of  
bottom plate



M12 x 150mm galvanised  
coach screw and 50 x 50 x  
3mm square galvanised washer

### 3 Timber Floor - External Walls Hold Down - Option 2

13 Scale: 1:10

### 4 Timber Floor - Internal Walls Hold Down

13 Scale: 1:10

PLANS AND SPECIFICATIONS  
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SIGNED 16 OCT 2008 DATE  
AUTHORISED OFFICER

Job  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

Builder  
GOLDSMITH DEVELOPMENTS LTD

Date  
06/09

Page Scale  
1:10

Drawn By  
Gib Panel Hold Downs

BENNETT DRAUGHTING

Page No

13

Total Pages

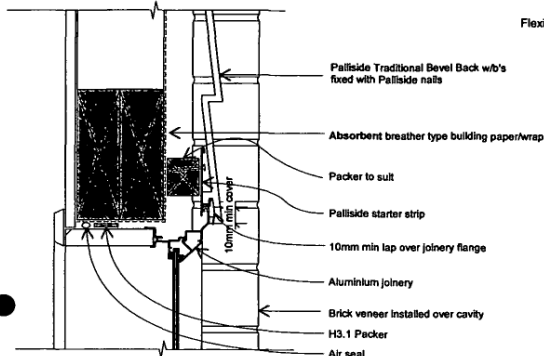
21

13

Wall Hold Down Details

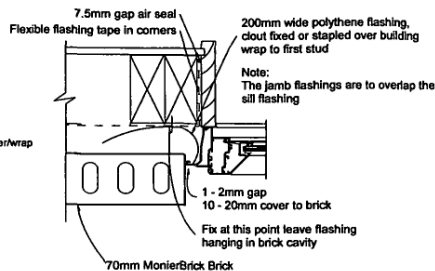
Scale: 1:10

1 Window Head - Palliside Cladding Above  
14 Scale: 1:5

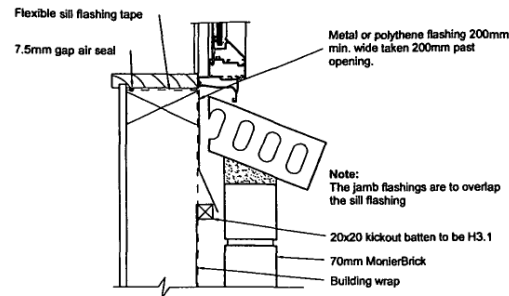


Weatherboard fixing length to be adjusted to suit cavity batten depth

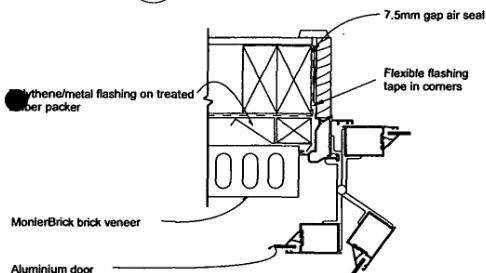
2 Window Jamb - Aluminium  
14 Scale: 1:5



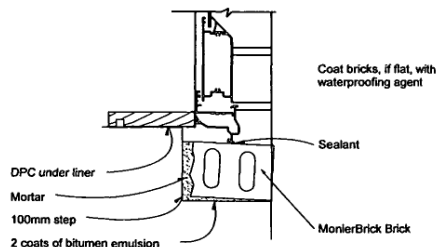
3 Window Sill - Aluminium  
14 Scale: 1:5



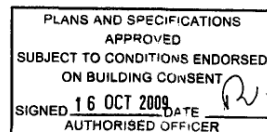
4 Door Jamb - Aluminium  
14 Scale: 1:5



5 Brick Door Sill  
14 Scale: 1:5

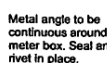
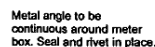
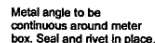


Note:  
If brick is to be sloped further, either increase the depth of the step or reduce the thickness of the brick.



14 Monier Details  
Scale: 1:5

Job NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 06/09	
Page Scale 1:5	
Drawn By Monier Brick	
BENNETT DRAUGHTING	
Page No 14	Total Pages 21



Building year

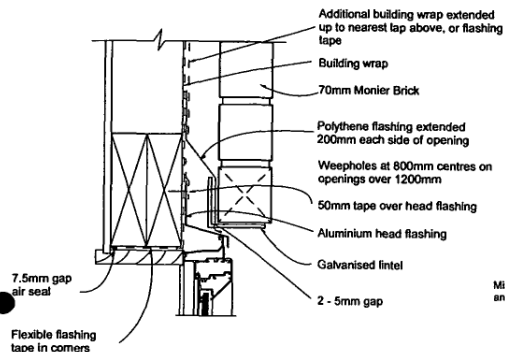
**AUTHORISED OFFICER**



Total Pages

15 Monier Details  
Scale: 1:5

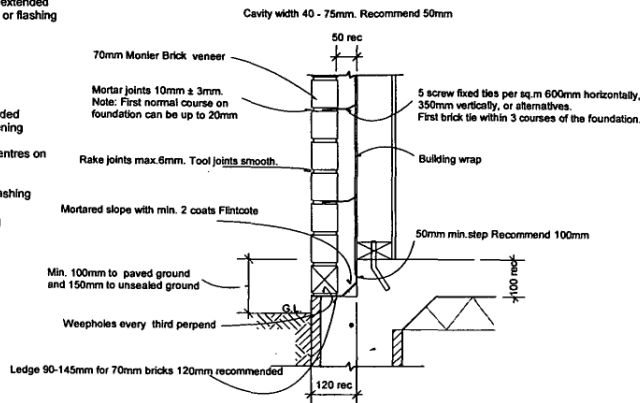
**1 Window Head - Aluminium**  
**15a** Scale: 1:5



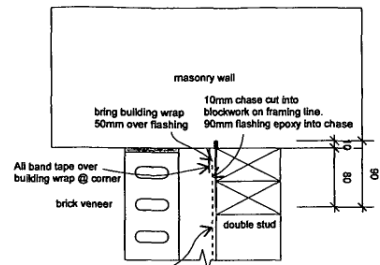
**Note:** Scale: 1:5  
 a.2.28119; For openings greater than 2.0m, provide a landing for the lintel of 5.15289; 200mm for each side of the opening.  
 b.2.38664; For openings less than 2.0m allow 100mm each side of opening.

**Important:**  
 a.2.28119; All lintel bars must be propped until mortar is set (7 days).  
 b.2.38664; It is important to allow the first 3 courses of the brickwork over an opening to set before 5.15289; laying any more bricks above.  
 c.2.49384; Provide brick ties within the bottom two courses.

**2 Brick Veneer - Standard Detail**  
**15a** Scale: 1:5

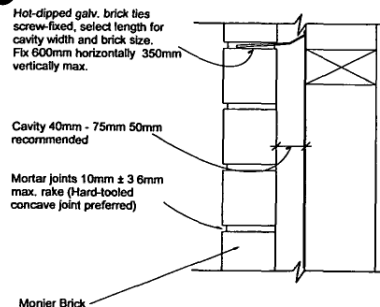


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 16 OCT 2009  
 SIGNED DATE  
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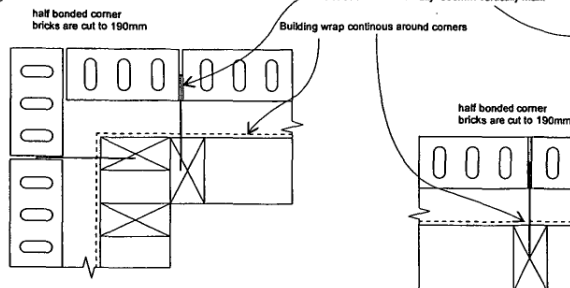


**6 Brick Veneer / Blockwall Junction**  
**15a** Scale: 1:5

**3 Brick Veneer - Typical Wall Section**  
**15a** Scale: 1:5



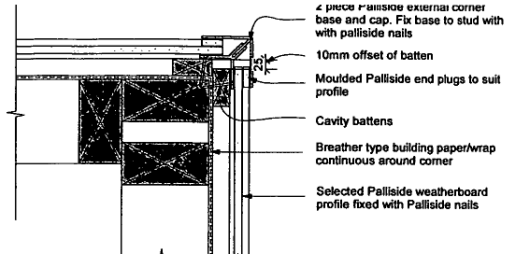
**4 Brick Veneer - External Corner**  
**15a** Scale: 1:5



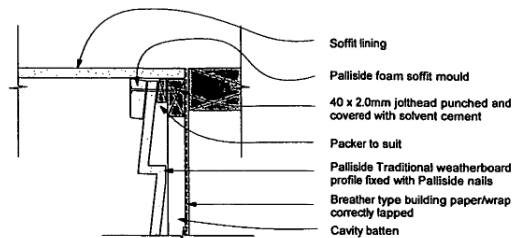
**5 Brick Veneer - Internal Corner**  
**15a** Scale: 1:5

**15a Monier Details**  
 Scale: 1:5

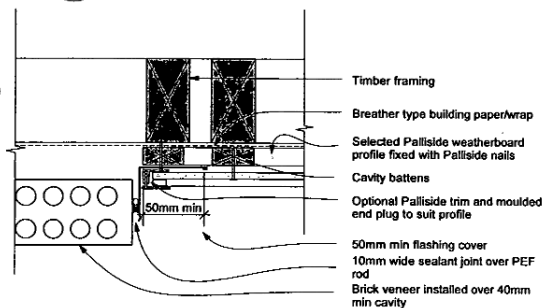
Job NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 06/09	
Page Scale 1:5	
Drawn By Monier Brick	
BENNETT DRAUGHTING	
Page No 15a	Total Pages 21



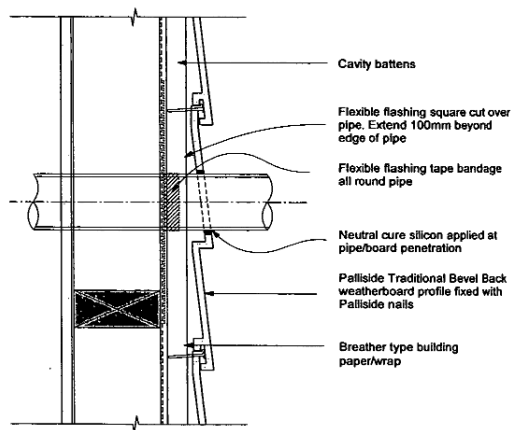
1 External 2 Part Boxed Corner  
16



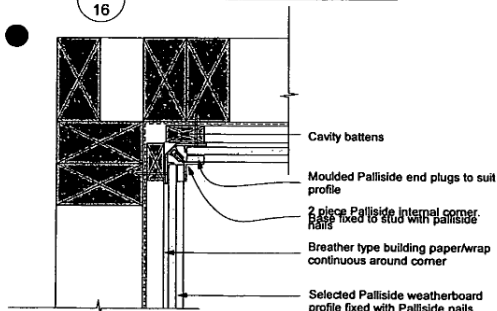
2 Finish at Soffit  
16



3 Palliside / Brick - Vertical Join  
16

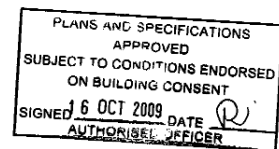


4 Palliside - Pipe Penetration  
16



5 Internal 2 Part Boxed Corner  
16

AMENDED 04/08/09  
AS PER RFI BY WCC



16 Palliside Details  
1:5

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Date 08/09	
Page Scale 1:5	
Drawn By Palliside	
BENNETT DRAUGHTING	
Page No 16	Total Pages 21

Detail covered by BRANZ Appraisal No. 491 (2005) for windows up to and including 2.4m For larger windows refer to the WANZ Window Specifications for guidance and verification.

Palliside Traditional Bevel Back weatherboard profile fixed using Palliside nails

Additional breather type building paper/wrap from overlap above, lapped over flashing.

Vermín strip

Palliside fastfix fastener

H3.1 timber packer at fixing

5mm gap

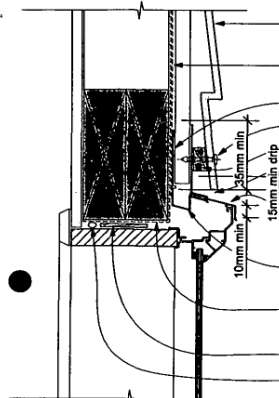
Head flashing with 15degree fall. End of head flashing requires stop end achieved by way of upturning head flashing or application of sealant at cavity batten junction

WANZ Cavity closer flashing (Available from window fabricator)

Breather type building paper/wrap dressed into opening with flexible tape installed over wrap to corners at head

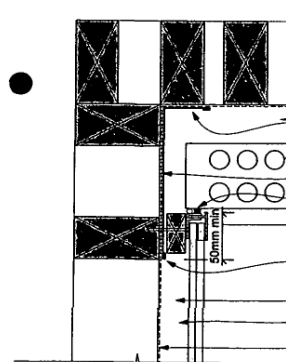
H3.1 timber packer to suit

Airseal



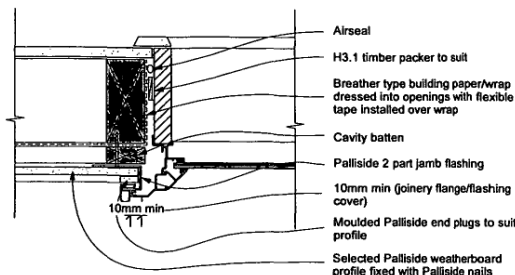
1 Palliside - Window Head Detail

17



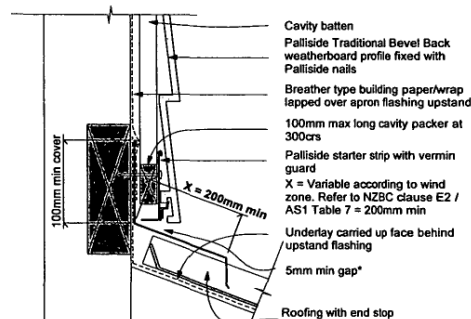
5 Palliside / Brick - Internal Corner Junction

17



2 Palliside - Window Jamb Detail

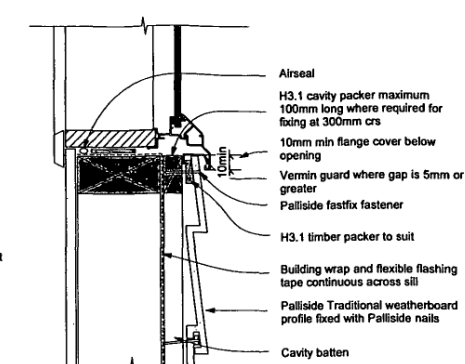
17



4 Palliside - Horizontal Apron Flashing

17

\*This detail may be used for roofs with a pitch of 12degrees minimum. Where the pitch is less than 12degrees 35mm min clearance is required between the underside of the cladding and the apron flashing



3 Palliside - Window Sill Detail

17

A sloping sill trimmer is required when the glazing pocket of the window or door joinery is positioned back past the line of the wall frame

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AUTHORISED OFFICER	

Job  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

Builder  
GOLDSMITH DEVELOPMENTS LTD

Date  
06/09

Page Scale  
1:5

Drawn By  
Palliside

BENNETT DRAUGHTING

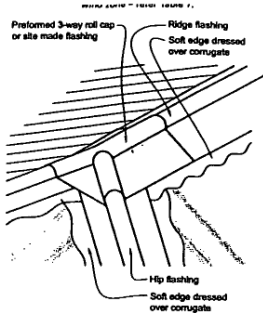
Page No  
17

Total Pages  
21

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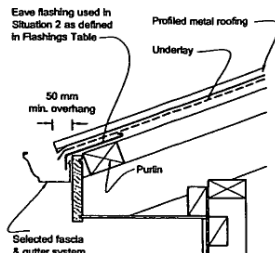
17 Palliside Details

1:5

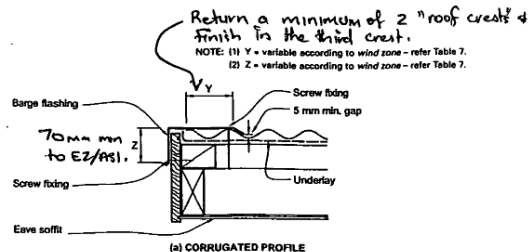


1  
18 Ridge Flashing

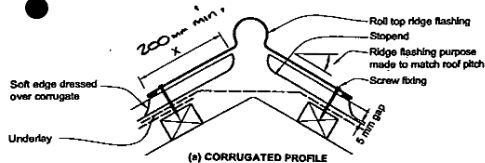
NOTE: X = variable according to wind zone - refer Table 7.



2  
18 Eave Flashing

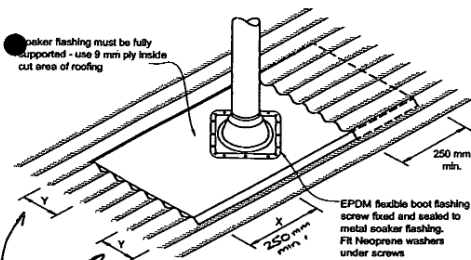


3  
18 Barge Flashing

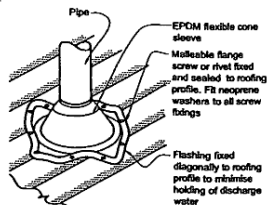


(a) CORRUGATED PROFILE

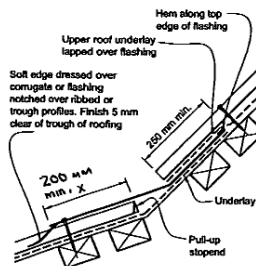
NOTE: (1) X = variable according to wind zone - refer Table 7.  
(2) Y = to cover minimum of two crests - refer Table 7.  
(3) Suitable for pipes from 60 mm to 200 mm diameter.  
(4) Suitable only for roof pitches of 10° or higher.



4  
18 Pipe Penetration Details



NOTE: (1) Max. roof pitch for this flashing 45°, minimum pitch 10°.  
(2) For pipes up to 60 mm diameter.



5  
18 Change In Pitch

18 Roof Details  
1:10

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AUTHORISED OFFICER	

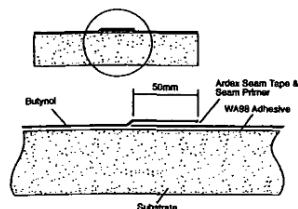
Job NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 06/09	
Page Scale 1:10	
Drawn By E2/AS1	
BENNETT DRAUGHTING	
Page No 18	Total Pages 21

min. of 2 "roof crest" & to finish in the third crest - strictly to E2/AS1.

## BONDING THE LAPS

Roofs with a pitch of less than 5°, all coloured membranes and all guttering and areas subjected to periodic ponding require special lap bonding.  
Refer Acceptable Solution E2/AS1 8.5.5.2a.

All coloured membranes, irrespective of pitch require special lap bonding.

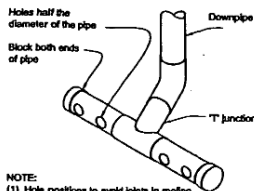
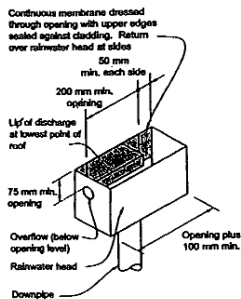
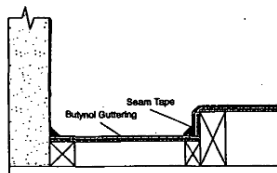


1. The top lap is positioned and the bottom sheet marked to indicate the edge of the top sheet.
2. The top sheet is folded back.
3. The Ardex Seam Primer is then applied to the Butynol in the area marked on the bottom sheet and 50mm in from the edge on the top sheet. The Ardex Seam Primer is applied to the mating surfaces using a synthetic scrubbing pad. Scrubbing pads should be replaced as they become dirty. Allow the primer to become 'touch dry'.
4. Position and unroll the 50mm Ardex Seam Tape along the seam. The edge of the seam tape should be aligned to the mark on the bottom membrane sheet. The see-through backing film makes this very simple.
5. Roll the length of the seam with backing film still in place.
6. Remove the backing film from the Ardex Seam Tape by pulling at a 45° angle away from the seam. Keep the backing film low to the roof surface as it is removed.
7. Fold into place the primed edge of the top sheet.
8. Roll the completed seam.

Black Butynol and roofs with minimum pitch of 5° and sufficient fall to prevent periodic ponding may be formed using the sheet bonding adhesive WA98. All laps must be wiped with WA98 solvent prior to bonding.

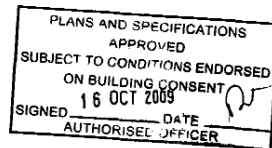
## FORMING LAPS FOR GUTTERS

Laps are most important in gutter work and should be formed using Ardex seam tape and seam primer.  
All internal boxed gutters can be easily formed to any shape or size using Butynol over any specified substrate.



NOTE:  
(1) Hole positions to avoid joints in roofing.  
(2) When downpipe is located in corner, spreader to be L-shaped.

## 2 Spreader Detail



Job  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

Builder  
GOLDSMITH DEVELOPMENTS LTD

Date  
06/09

Page Scale  
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Drawn By  
E2/AS1 / Mitek

BENNETT DRAUGHTING

Page No

19

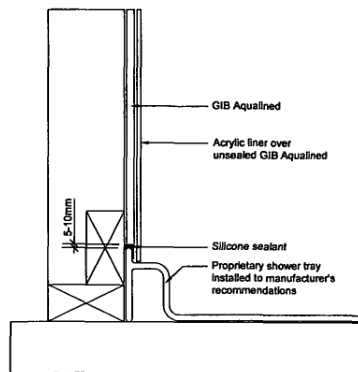
Total Pages

21

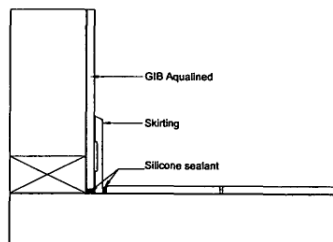
## Gutter Details

1:10

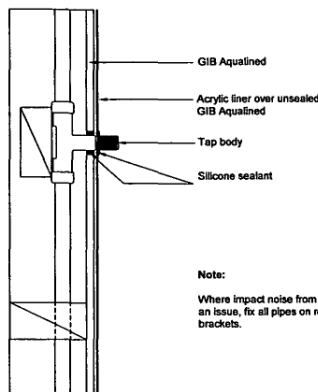
## 1 Rainwater Head & Laps in Membrane Gutter



1 Shower Wall / Tray Detail  
20 Scale: 1:5



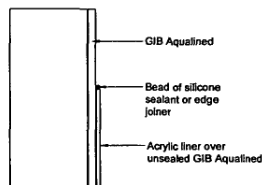
3 Wall / Floor Detail  
20 Scale: 1:5



Note:

Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

2 Penetration Detail  
20 Scale: 1:5



4 Liner Top Detail  
20 Scale: 1:5

20 Wet Area Details  
Scale: 1:5

PLANS AND SPECIFICATIONS APPROVED	
SUBJECT TO CONDITIONS ENDORSED ON BUILDING CONSENT	
SIGNED	16 OCT 2009 DATE
AUTHORISED OFFICER	

Job NEW ZEALAND HOUSING FOUNDATION WEST COAST ROAD DEVELOPMENT	
Builder GOLDSMITH DEVELOPMENTS LTD	
Date 06/09	
Page Scale 1:5	
Drawn By Gib Wet Areas	
BENNETT DRAUGHTING	
Page No 20	Total Pages 21

**Figure 14:** Seismic Restraint of Storage Water Heaters 90 – 360 litres  
Paragraph 6.11.4

Diagram illustrating the seismic restraint of storage water heaters (90 – 360 litres) using straps and blocking.

**Storage water heaters to be restrained with 25 x 1mm galvanneal steel straps tensioned when fixed in place. Straps to be fixed to wall framing with:**

- 1 No. 8mm coach screw with 30x2mm thick washer, or
- 2 No. 20x25mm thick washers.

Screws to penetrate timber framing a minimum of 50mm.

**Extra centre strap for water heaters exceeding 200 litres**

Dimensions shown: 100mm Max. (height of water heater), 100mm Max. (height of water heater).

**50x50mm vertical blocking full height of water heater, fixed to wall framing with 1 No. 100x3.75mm nail at 600 maximum centres**

**Light timber frame wall complying with NZS 3604.**

NZBC B1.3.2 requires *building elements* (including *storage water heaters*) to be adequately supported including support against earthquake forces. The method illustrated in Figure 14 is acceptable for *water heaters* up to 360 litre capacity. Where fittings and pipework are attached to the *water heater* through the supporting platform or floor a 50 mm minimum clearance shall be provided between the fitting and the support structure.

### 6.12 Hot water pipe sizes

**6.12.1** The diameter of hot water supply pipes from storage water heaters and to sanitary fixtures shall be no less than those required by Table 4.

RISK SCORE	LOW		MEDIUM	HIGH	VERY HIGH	SCORE
<u>WIND ZONE</u>	0	1	2	3	4	5
<u>NUMBER OF STOREY'S</u>	1 STOREY	2 STOREY'S IN PART	3 STOREY'S	4	MORE THAN 2 STOREY'S	1
<u>ROOF TYPE</u>	HIP OR GABLE WITH EAVES	GABLE WITHOUT EAVES OR SIMPLE MONO-PITCH	3	COMPLEX SHAPES & DORMERS	4	MULTIPLE LEVELS COMPLEX SHAPES PARAPETS
<u>EAVE WIDTH</u>	0	GREATER THAN 600 MM @ 1 <sup>ST</sup> FLOOR LEVEL	1	450-600 OR GREATER THAN 600 MM @ 2 <sup>ND</sup> FLOOR LEVEL	2	100-450MM, 100-450MM @ 2 <sup>ND</sup> FLOOR LEVEL 450-600MM @ 3 <sup>RD</sup> FLOOR LEVEL
<u>ENVELOPE CAPACITY</u>	0	SIMPLE RECTANGULAR L & T OR BOOMERANG ALL WALLS COVERED BY EAVES.	1	BUILDINGS WITH ROOFS ABUTTING ADJACENT WALLS	2	5
				BUILDINGS & MULTIPLE CLADDING AND ROOFLINE ABUTTING ADJACENT WALLS	3	AS HIGH WITH MULTIPLE PENETRATIONS, OTHER THAN DOORS & WINDOWS, THROUGH WALLS, COMPLEX JUNCTIONS
<u>DECKS &amp; BALCONIES</u>	0	NONE, TIMBER SLAT DECK OR PORCH @ GROUND LEVEL	1	FULLY COVERED IN PLAN BY ROOF OR TIMBER SLAT DECK ATTACHED @ 1 <sup>ST</sup> FLOOR OR 2 <sup>ND</sup> FLOOR LEVELS	2	3
				EXPOSED IN PLAN OR CANTILEVERED @ 1 <sup>ST</sup> FLOOR LEVEL	4	EXPOSED IN PLAN OR CANTILEVERED @ 2 <sup>ND</sup> FLOOR LEVEL OR ABOVE
<u>KEY</u>	0	1	2	3	4	5
			0-15 MEDIUM RISK			7

PLANS AND SPECIFICATIONS  
APPROVED  
SUBJECT TO CONDITIONS ENDORSED  
ON BUILDING CONSENT  
16 OCT 2009  
SIGNED \_\_\_\_\_ DATE \_\_\_\_\_  
AUTHORISED OFFICER \_\_\_\_\_

**Job**  
NEW ZEALAND HOUSING FOUNDATION  
WEST COAST ROAD DEVELOPMENT

**Builder**  
GOLDSMITH DEVELOPMENTS LTD

**Date**  
06/09

Page Scale  
NTS

**Drawn By**  
G12

**BENNETT DRAUGHTING**

Page No 21	Total Pages 21
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# Building Consent

## SECTION 51, BUILDING ACT 2004



### THE BUILDING

Street address of building: 19 Titch Place, Glen Eden

Legal description of land where building is located: LOT 32 DP 389289

\*Building name:

‡Location of building within site/block number: LOT 32 DP 389289

‡Level/unit number:

### THE OWNER

Name of owner: NEW ZEALAND HOUSING FOUNDATION

\*Contact person: NEW ZEALAND HOUSING FOUNDATION

Mailing address: PO Box 44018, Point Chevalier, AUCKLAND 1246

Street address/registered office:

Phone number: Landline: Mobile:

Daytime: After hours:

Facsimile number:

Email address:

Website:

First point of contact for communications with the council/building consent authority: †

### BUILDING WORK

The following building work is authorised by this building consent:

New 5 Bedroom Dwelling with attached (internal access) garage. Cat 2.

This building consent is issued under section 51 of the Building Act 2004. This building consent does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).

This building consent also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

‡This building consent is subject to the attached conditions:

3 pages

## COMPLIANCE SCHEDULE

A compliance schedule is not required for the building.

## ‡ATTACHMENTS

Copies of the following documents are attached to this building consent:

Signature

Position

On behalf of: Waitakere City Council

Date: 23 October 2009

\*Delete if the applicant is an individual.

†Contact details must be in New Zealand.

‡Delete items not applicable.

§Delete if the building is intended to have a life of 50 years or more.

Notes (The following are not applicable for amendments):

1. On completion of the work covered by this building consent application must be made on the prescribed form for Code Compliance Certificate, once final inspection(s) have passed.
1. The building consent will lapse and be of no effect if the building work has not been commenced within 12 calendar months of the date of issue of the consent.
2. Work must be completed and the Code Compliance Certificate issued within 2 years of the date of approval for granting of the consent.

## **CONDITIONS OF BUILDING CONSENT COM-2009-1374**

The above Building Consent has been approved today subject to the following conditions:-

1. To notations on plans.
2. The applicant shall take all steps necessary to avoid damaging the street, footpath or verge area and shall reinstate any damage to those areas to the satisfaction of Council.
3. Where one is not already constructed, the owner shall construct to a standard satisfactory to Council a vehicle crossing between the carriageway and the owner's land in accordance with Council Code of Practice.

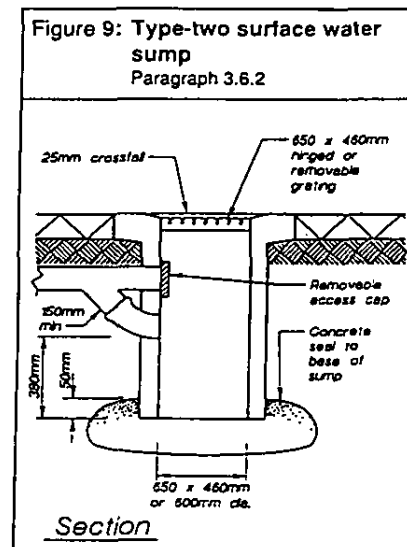
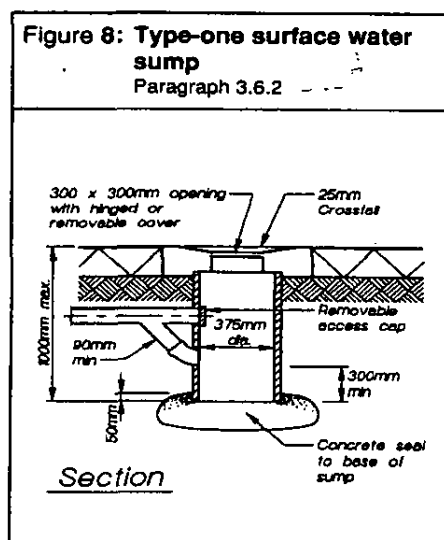
If a non-standard crossing is required approval must be obtained from Transport Assets prior to construction of the crossing.

When excavating for the crossing the owner shall take all steps necessary to avoid damaging Council's watermain, which is generally located in the berm area with 450mm minimum cover. Where more than 250mm is being excavated the depth and location of the watermain should be confirmed by hand digging prior to commencement of excavation. (For further information please contact Council on phone 836-8045). In the event of any damage to the watermain the cost of any repairs will be charged to the owner.

4. Officers of Council are entitled at all times during normal working hours or while work is being carried out, to inspect
  - land on which building work is being or is proposed to be carried out
  - building work that has been or is being carried out on or off the building site
  - any building
5. All handrails/barriers shall comply with N.Z.B.C. F4 & B1/AS 2. Stairs and Landings shall comply with N.Z.B.C. D1.
6. The height of the finished floor level of a concrete slab-on-ground floor above adjacent ground shall be no less than:
  - a) For masonry veneer wall claddings:
    - 100 mm if ground permanently paved
    - 150 mm if unpaved
  - b) For cladding other than masonry:
    - 150 mm if ground permanently paved
    - 225 mm if unpaved
7. Fixings of lintels, top plates, rafters, trusses and purlins shall comply with the New Zealand Building Code. Compliance with New Zealand Standard 3604:1999 table 8.14 and figure 8.12 will satisfy the requirements of the building code.
8. Opening windows which permit a fall of greater than 1.000m, shall have restrictors fitted in accordance with F4 of the NZ Building Code.
9. Domestic smoke alarms complying with at least one of UL 217, CAN/ULC S531, AS 3786, BS 5446:Part 1 standards shall be installed in accordance with NZBC clause F7.

10. Drainage shall be inspected and tested by Waitakere City Council Plumbing & Drainage Surveyor prior to backfilling.
11. Stormwater / sanitary drainage shall be carried out by a registered drainlayer in compliance with the NZ Building Code or an alternative solution approved by Council.
12. Prior to commencing work the owner shall ensure that the proposed building is clear of any sewers and shall ensure gravity fall of foul and stormwater drains is obtained within required gradients.
13. Sanitary plumbing to be carried out by a registered plumber in compliance with the NZ Building Code or an alternative solution approved by Council and shall be inspected by Waitakere City Council Plumbing & Drainage Surveyor prior to closing in walls, cavities and under floor.
14. A storm water cesspit is to be located in yard / driveway in accordance with NZBC E1/AS1 3.6 to obtain best storm water control. Yard / driveways to be kerbed or channelled to direct stormwater to cesspit.

15.



16. Provide an overflow relief gully as per AS/NZS 3500.2.2 1996.
17. As-Built Drawings:  
The drainlayer must provide an 'as-built' drainage drawing to the drainage surveyor at the time of the inspection.
18. The builder/drainlayer is to check and verify all drainage depths, positions and connections before commencing any work on site.
19. Before commencement of any works and until completion of exposed earth site-works, adequate sediment and erosion control measures shall be constructed and maintained by the consent holder. The control measures must be maintained until the site has been adequately stabilised against erosion. The construction and maintenance shall be in accordance with Appendix 3, Erosion and Sediment Control Measures Appendix to the Natural Area Rules of the Waitakere City Council District Plan.

20. Subject to compliance with the conditions of Resource Consents (LUC/SUB2006-1077/1078) granted 30/10/06 pursuant to Sections 104, 104B, 104D & 108 of the Resource Management Act 1991.
21. Recommendations of soils report are to be read in conjunction with building consent and strictly adhered to.
22. Grade b masonry shall be subjected to construction observation by a design structural engineer (registered with WCC) or his nominated representative during construction.
23. Geotechnical engineer (registered with WCC) is to be retained to inspect all excavations, foundations over public & private drains and site conditions exposed during construction prior to pouring any concrete, to check that ground conditions encountered are consistent with those assumed in soils report and certify same to Council.
24. A suitably qualified engineer (registered with WCC) is required to observe the construction of the following building elements to ensure compliance with the design assumptions, requirements, and details has been achieved, and to certify the same to Council. Specifically, observation and certification is required in respect of:-
  1. **Rib-raft Foundation Slab**
25. **PUBLIC DRAINAGE INFRASTRUCTURE – ECOWATER CONDITIONS**
  - (DE 1) Provide certification from the engineer that the foundations have been constructed in accordance with the approved plans 'Conqra Polyraft Plan WJ15193 S1 dated 19.03.08 and methodology to protect the public drain. Provide a **post-construction CCTV** inspection of the public drains undertaken after the foundations/piles have been constructed, and prior to commencing construction of the walls. Where the post-construction CCTV reveals a defect in the public drain, the owner shall bear all costs of any remedial measures necessary to ensure proper and safe operation of the drain, before resuming building works.
  - (DE 2) All outstanding **fees** incurred during the construction process are required to be paid in full prior to releasing the Code Compliance Certificate.

14 October 2009

NEW ZEALAND HOUSING FOUNDATION  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

**Building Consent Application:** COM-2009-1374  
**Application Location:** 19 Titch Place, Glen Eden  
**Description of Project:** New 5 Bedroom Dwelling with attached (internal access) garage.  
Cat 2.

Dear Sir/Madam

#### Request for Further Information

A) Please note that District Plan compliance is assessed separately with the PIM application. You should refer to the PIM to identify all requirements in terms of District Plan matters. If changes are required to the Building Consent application as a result of resolving District Plan issues, a new Building Consent application may be required.

B) Council's Technical Specialists have now completed the initial processing of your consent. We request that you supply **two copies** of each of the following:

#### 1. BUILDING SURVEYOR REQUIREMENTS

- a. As specified on the drawings, substrate and floor framing requirements to wet areas are in accordance with the Superflex BRANZ appraisal No.472 - Section 8.1. Please provide manufacturer's confirmation that the proposed vinyl over the Superflex membrane are compatible, as specified on Page 8
- b. Please specify on the drawings, all flashing X, Y & Z minimum dimensions in accordance with the requirements of Acceptable Solution E2/AS1..
- c. Please provide Manufacturer's Specifications or Branz Appraisal for Thermakraft 215 self supporting roof underlay.
- d. Please provide manufacture Specifications for Particleboard flooring

Please supply all requested information in duplicate, highlight all changes on any amended plans, complete the enclosed form, and send only to the following:

**Building Consent Processing Unit**  
**Waitakere City Council**  
**Private Bag 93109**  
**Henderson**  
**Waitakere City 0650**

We would appreciate the return of the **complete set** of information by 12 November 2009, so that processing can continue without delay.

**Please note that submission of separate requirements will not be processed. Electronic submissions will not be accepted.**

Advise us immediately in writing should you no longer wish to proceed with this application.

Should you wish to discuss any of the technical requests above, please contact the staff member as indicated by phone on 839 0400.

Yours faithfully

pp   
● Radmila Ristic

cc: **Owner:**  
NEW ZEALAND HOUSING FOUNDATION  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

●

# PROJECT INFORMATION MEMORANDUM NO: COM-2009-1374

Section 31, Building Act 2004  
ISSUED BY: WAITAKERE CITY COUNCIL




APPLICANT	PROJECT
<b>Name:</b> NEW ZEALAND HOUSING FOUNDATION <b>Mailing Address:</b> PO Box 44018 Point Chevalier AUCKLAND 1246	<b>Proposed Work</b> New 5 Bedroom Dwelling with attached (internal access) garage. Cat 2. <b>Intended Use(s) in detail:</b> Unknown <b>Intended Life:</b> Indefinite, but not less than 50 years
<b>PROJECT LOCATION</b>	<b>This is:</b>
<b>Street Address:</b> 19 Titch Place, Glen Eden	<input checked="" type="checkbox"/> <b>Confirmation that the proposed</b> building work may be undertaken, subject to the provisions of the Building Act 2004, and any requirements of the Building Consent.
<b>LEGAL DESCRIPTION</b>	Not yet applied for <input type="checkbox"/>
<b>Property Number:</b>	No: attached <input type="checkbox"/>
<b>Valuation Roll Number:</b>	Not yet issued <input type="checkbox"/>
<b>Legal Description:</b> LOT 32 DP 389289	

This project information memorandum includes:

Information identifying relevant special features of the land concerned.	Yes
Information about the land or buildings concerned notified to the Council by any statutory organisation having the power to classify land or buildings.	No
Details of relevant utility systems.	Yes
Details of authorisations which have been granted.	Yes
Notification of any other authorisations which must be obtained before the proposed building work may be undertaken.	No
Details of authorisations which have been refused.	No

Signed for and on behalf of Council:

Name: 

Position: Account Manager - Building Consents

Date: 14-Oct-2009

**WAITAKERE CITY COUNCIL**

**PROJECT INFORMATION MEMORANDUM**



**PIM :** COM-2009-1374

**SITE ADDRESS:** 19 Titch Place, Glen Eden

**LEGAL DESCRIPTION:** LOT 32 DP 389289

**BUILDING**

**Use of a Public Building**

In accordance with Section 363 of the Building Act 2004, please note that it is an offence to permit the use of a public building for which no building consent or code compliance certificate has been issued.

**Electricity Transmission Lines and Towers**

If there are high-tension electricity transmission lines over or adjacent to the property or there are transmission towers/pylons on or adjacent to the property the applicant must ensure that the proposed building complies with the line clearances and/or the requirements for excavation in the vicinity of towers/pylons prescribed in the New Zealand Electrical Code of Practice for Electrical Safe Distances.

It is the responsibility of the applicant to ensure compliance and if necessary to contact the line owner to determine whether the proposed building will comply prior to commencing construction.

**Hazard Register:**

- a. The Owner shall not carry out any development nor place, erect, construct or permit to remain any buildings on any part of the land unless the foundations of all buildings have been the subject of specific design by a registered engineer who is familiar with the content of the Geotechnical Completion Report prepared by Babbage Consultants Reference 42608/GE and dated October 2007 (held in Council's records under RMA20061078 ) (hereinafter referred to as "the said Geotechnical Completion Reports)
- b. All earthworks, development and construction on any part of the land shall be carried out in accordance with:
  - (i) The report referred to herein where applicable; and
  - (ii) All specific design requirements referred to herein where applicable; and
  - (iii) To the entire satisfaction of the Waitakere City Council.

**Wind Zone:** Low

**Sea Spray Zone:** No

**PLUMBING**

Existing foul water drains:	NO	Existing storm water drains:	NO
Sanitary Sewer:	YES	Stormwater Sewer:	YES
If no state any disposal requirements:	N/A		
Watercare Services Limited Sewer clearance required:	NO		
Watercare Services Limited Bulk Watermain clearance required:	NO		

**Miscellaneous Comments**

N/A

**HEALTH/DANGEROUS GOODS:**

Not applicable.

**DRAINAGE**

Requirements for building over or adjacent to Council sewer: YES

The proposal is to construct a new 5 bedroom dwelling with an attached garage on a vacant lot referred as Lot 32 created under SUB-2006-1078. The site has provisions to connect to reticulated networks for stormwater, wastewater and water supply provided under the sub-divisional development. The proposed building footprint is in close proximity to the existing public wastewater drains at the western and northern corners. Foundation bridging detail has been provided. The application for a water supply new connection 3WATER-2008-607 has been processed and invoiced.

**MISCELLANEOUS REQUIREMENTS****PLANNING**

Operative District Plan:

Natural Area:	General
Natural Landscape Elements:	NA
Human Environment:	Living
Heritage, Designation or Scheduled Site Notation:	Nil
Road Hierarchy:	West Coast Rd - District Arterial; Pyramid Place - Local
Natural Hazards:	Previous Lot 2 DP 339810 High Pressure Natural Gas Pipeline Special Feature Nos: 12071 (replanting of reserve); 12073 (natural flowpath); 12076 (overland flowpath); 12087 (flooding) Proposed Lot 32 - geotech

**Impact on Waahi Tapu?:**

Assessed on Resource  
Consents (LUC 2006-1077 &  
SUB 2006-1078)

**Archaeological Site?:** In the event of archaeological evidence being uncovered (e.g. shell, middens, hangi or ovens, pit depressions, defensive ditches, artifactual material or human bones) work shall cease in the vicinity of the discovery, the area secured, and the Council (Ph 839-0400) contacted. Activity on the site will remain halted until the Manager Resource Consents gives approval for operations to recommence.

**District Plan:**

**Site Identified to be potentially or subject to Erosion/Stability or subsidence:** NO

**Site Identified to be potentially or subject to Flooding :** YES

**Planning Special Feature:**

Please note that the previous property (Lot 2, DP 339810) was previously shown under the Transitional District Plan as being located in a flood sensitive area. Proposed Lot 46 appears to be clear of this flood sensitive area.

**Resource Consent Requirements:****Land Use Consent requirements: \*1**

**\*1 ALREADY GRANTED**

**LUC 2006-1077**

Handling Officer: Felicitas Dhlwayo

Date Granted: 30-10-2006

The following geotechnical conditions of the above resource consent must be complied with during the construction and accompanying earthworks:

**Geotechnical Conditions**

34. A producer statement must be provided on completion of earthworks together with an earthworks completion report stating what requirements if any are necessary for the individual lots.
35. Unless there is clear evidence in the earthworks completion report to be provided by an engineer that NZS 3604 requirements have been fully met, all foundations shall require specific design.
36. Foundations of all lots shall be verified by an experienced geotechnical engineer familiar with the geotechnical report and shall take into account the potential for shrink/swell behaviour.

**Subdivision Consent Requirements:**

**ALREADY GRANTED**

**SUB 2006-1078**

Handling Officer: Felicitas Dhlwayo

Date Granted: 30-10-2006

Section 224: Issued

**Any Other Requirements:**

YES

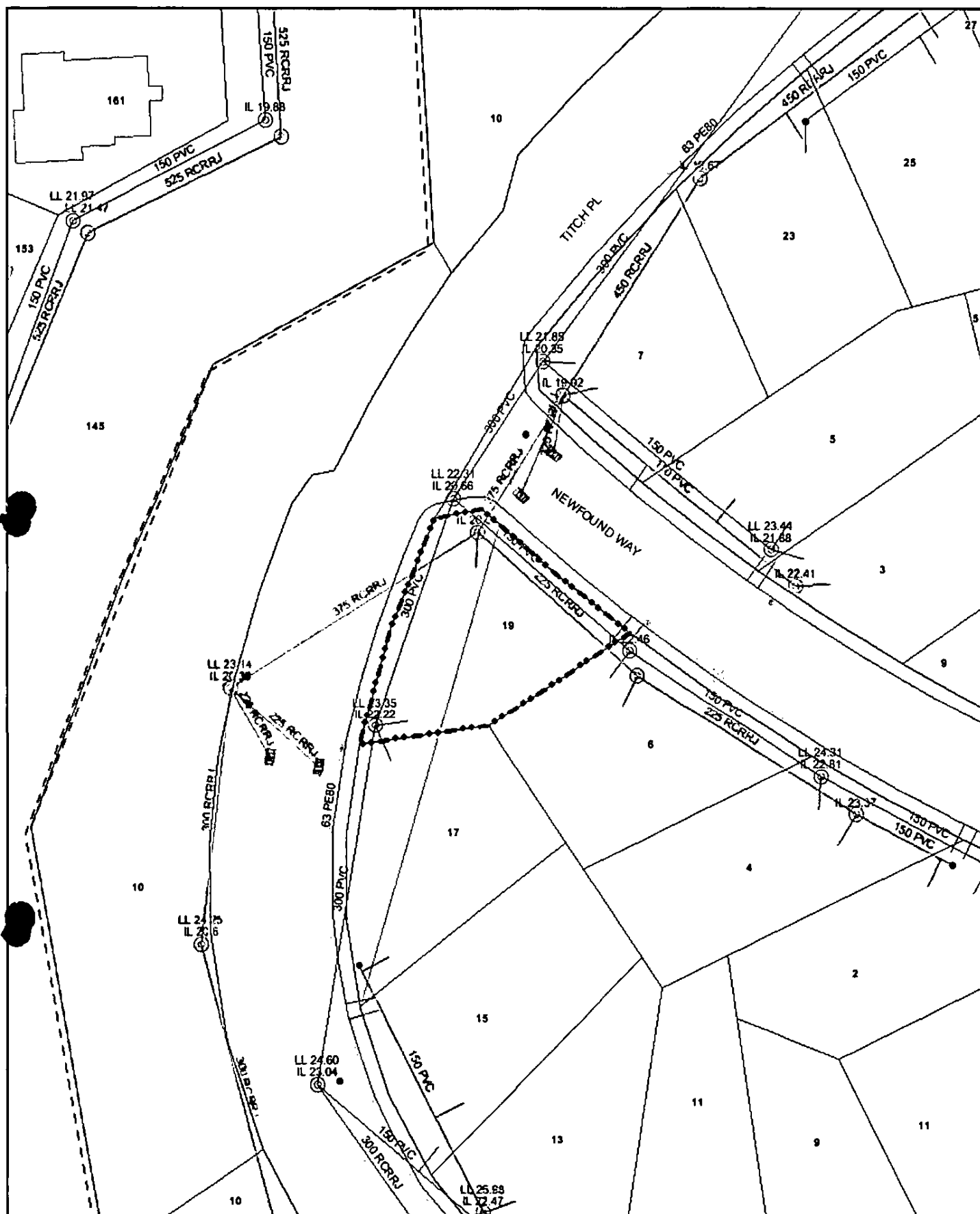
Subject to compliance with the conditions of Resource Consent (RMA LUC 2006-1077 & SUB 2006-1078) granted 30-10-2006 pursuant to Sections 93, 94, 94A - 94D, 104, 104B, 108 & 220 of the Resource Management Act 1991.

**Before commencement of any works and until completion of exposed earth site-works**, adequate sediment and erosion control measures shall be constructed and maintained by the consent holder. The control measures must be maintained until the site has been adequately stabilised against erosion. The construction and maintenance shall be in accordance with **Appendix 3, Erosion and Sediment Control Measures Appendix** to the **Natural Area Rules** of the Waitakere City District Plan 2003.

A Licensed cadastral Surveyor shall certify to Council in writing prior to work progressing beyond the foundations that the building will comply with the Height in Relation to Boundary rules of the Proposed District Plan. No work shall proceed beyond this stage until a Licensed Cadastral Surveyor shall certify to Council in writing prior to work progressing beyond the framing stage that the buildings are located exactly as proposed in the application and will not exceed the degree of infringement applied for in relation to the overall height and height in relation to boundary controls of the District Plan and elsewhere complies with the height in relation to boundary and overall height rules of the District Plan. No work shall proceed beyond this stage until receipt of such certification, to the satisfaction of the Manager Resource Consents.

**Vehicle Crossing/Street Damage Deposit:**                      **REQUIRED**

If a vehicle crossing is required or the value of work requires a street damage deposit, pursuant to Waitakere City Council Bylaw No. 22 you are required to complete an application in the prescribed form for a vehicle crossing and street damage deposit with your application for building consent.



## UNDERGROUND SERVICES

Scale = 1:500



Print Date: 12/10/2009

### 19 Titch Place Glen Eden LOT 32 DP 389289

Cadastral Information from Land Information New Zealand Digital Cadastral Database DCDB Crown Copyright Reserved.

Services shown on public amenity land are not public drains unless used as through drains. While Council endeavours to provide accurate spatial data no guarantee as to the completeness and accuracy of the data shown on this plan can be given. All information, including levels and locations, are not of survey grade accuracy and should be verified on site. For enquiries about the information shown please phone the call centre (09) 839 0400.



**Waitakere City Council**  
Te Taiaro o Waitakere

# UNDERGROUND SERVICES LEGEND

## Water

### Water Supply Facility

- ☐ Water Pump Station
- ◇ Drinking Water Sampling Manual

### Water Supply Bulk Meter

- Bulk Meter
- Standard Meter Installation

### Water Supply Valve

- ⊕ Air Valve
- ⊙ Backflow
- ◀ No Return Valve
- △ Peet Valve
- ▲ Zone Valve Peet
- ⊞ Pressure Reducing Valve
- ⊞ Sluice Valve
- ⊞ Zone Valve Sluice
- Scour Valve
- Water Control Valve

### Water Supply Hydrant

- Water Supply Hydrant

### Water Supply Node

- Caps
- End Point
- Junction
- △ Reduce

### Water Supply Storage Unit

- RES Reservoir

### Water Supply Miscellaneous

- ⊙ Valve Chamber

### Water Supply Main Line

- WCC Assets
- - - - Pipe Bridge
- Water Care Assets
- Abandoned Assets
- - - - Private Assets

### Water Supply Service Line

- WCC Assets
- Abandoned Assets
- - - - Private Assets

## Stormwater

### Stormwater Manhole

- ⊖ Catchpit Manhole
- ⊙ Drop Manhole
- ⊙ Standard Manhole
- Inspection Chamber

### Stormwater Inlet

- ⊞ Catchpit - Super
- ⊞ Catchpit - Double
- ⊞ Catchpit - Single
- ⊞ Culvert / Pipe Inlet / Outlet / Wingwall
- ⊞ Open Pipe End
- ⊞ Debris Control Structure

### Stormwater Node

- End Point / Outlet Point / Trap

### Stormwater Miscellaneous

- Overflow Path

### Stormwater Storage Basin

- ⊞ Stormwater Pond
- ⊞ Low Impact Devices
- ⊞ Filtration Devices
- Detention Device

### Stormwater Main Line

- ++++ Subsoil Drain
- WCC Assets
- Abandoned Assets
- - - - Private Assets

### Stormwater Service Line

- WCC Assets
- Abandoned Assets
- - - - Private Assets

### Stormwater Channel

- Stormwater Channel

## Wastewater

### Wastewater Manhole

- ⊙ Drop Manhole
- ⊙ Manhole
- ⊞ Inspection Chamber

### Wastewater Miscellaneous

- ⊞ Campervan Dumping Point
- ⊞ Septic Tank Standard
- ⊞ Septic Tank High Tech

### Wastewater Node

- End Point

### Wastewater Pumpstation

- ⊞ Pumpstation

### Wastewater Main Line

- - - - Pipe Bridge
- - - - Rising Main
- WCC Assets
- Water Care Assets
- Abandoned Assets
- - - - Private Assets

### Wastewater Service Line

- WCC Assets
- Abandoned Assets
- - - - Private Assets

### Information Communication Technology

- ICT Node

### ICTManhole

- ⊞ ICT Inspection Chamber
- ⊞ ICT Manhole
- ⊞ ICT Traffic Chamber

### ICTDuct

- ICT Duct
- - - - ICT Fibre Optic Duct
- ..... ICT Traffic Cable Duct

### Miscellaneous

- Error in Unit Type
- Error in Unit Type

### Gas Petroleum

- - - High Pressure Gas Pipeline

### Contour

- 2 metre

21 October 2009

NEW ZEALAND HOUSING FOUNDATION  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

Dear Sir/Madam

**Re : Application Number**                      **COM-2009-1374**  
**Proposal**                                        **New 5 Bedroom Dwelling with attached (internal access) garage. Cat 2.**  
**Project Address:**                            **19 Titch Place, Glen Eden**

Thank you for your Building Consent application lodged with Council on 28-Sep-2009. This consent is now ready to be issued.

The following fees for processing the application are outstanding.

Our counter staff will produce invoice(s) when you collect your Building Consent as per the following fee schedule:

Counter Processing Fee	126.00
Plan Processing Fee	1,735.25
Design Check Fee	300.00
Fire and Egress Processing Fee	52.00
Planning Check Fee	144.00
Drainage Engineer - Ecowater Processing Fee	152.00
Records Fee	37.00
Issuing Fee	22.75
Inspection fees	2,670.00
VXG Fees - Vehicle crossing inspection	95.00
<b>Total to pay:</b>	<b>5334.00</b>

If payment is made by cheque(s) to a value of more than \$3,000.00, there will be a five working day clearance period before the consent is issued. If payment is made by Bank Cheque, this consent can be uplifted immediately. Council is unable to accept Credit Card payments.

Your Building Consent must be picked up within 42 days of the date of this letter, or we may refuse to issue the consent and return your application. Any outstanding processing fees will still be payable. Commencement of works relating to this application prior to issue of the consent is unlawful and subject to prosecution under the Building Act 2004.

Code Compliance Certificate Fee is payable at the time of Code Compliance Certificate application, and at the rate as shown in the Regulatory Fees and Charges schedule at that time.

Consent issued	____/____/____
Receipt No	_____
Issued by	_____ (GEMS CODE) «Merge_Type Code»

District Plan compliance is assessed separately with the PIM application. You should refer to the PIM to identify all requirements in terms of District Plan matters. If amendments are made to the PIM as a result of resolving District Plan issues a new Building Consent application may be required.

Yours faithfully



**Jacqueline Mutepfa**  
**PROCESS SUPPORT**  
(Copy sent to owner)

20 October 2009

NEW ZEALAND HOUSING FOUNDATION  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

*Letter reissued on  
21-10-09*

Dear Sir/Madam

**Re : Application Number**

**COM-2009-1374**

**Proposal**

**New 5 Bedroom Dwelling with attached (internal access) garage. Cat 2.**

**Project Address:**

**19 Titch Place, Glen Eden**

Thank you for your Building Consent application lodged with Council on 28-Sep-2009. This consent is now ready to be issued.

The following fees for processing the application are outstanding.

Invoice 433554 604.69

Our counter staff will produce invoice(s) when you collect your Building Consent as per the following fee schedule:

Counter Processing Fee	126.00
Plan Processing Fee	1,735.25
Design Check Fee	300.00
Fire and Egress Processing Fee	52.00
Planning Check Fee	144.00
Drainage Engineer - Ecowater Processing Fee	152.00
Records Fee	37.00
Issuing Fee	22.75
Inspection fees	2,670.00
VXG Fees - Vehicle crossing inspection	95.00

**Total to pay: 5938.69**

If payment is made by cheque(s) to a value of more than \$3,000.00, there will be a five working day clearance period before the consent is issued. If payment is made by Bank Cheque, this consent can be uplifted immediately. Council is unable to accept Credit Card payments.

Your Building Consent must be picked up within 42 days of the date of this letter, or we may refuse to issue the consent and return your application. Any outstanding processing fees will still be payable. Commencement of works relating to this application prior to issue of the consent is unlawful and subject to prosecution under the Building Act 2004.

Code Compliance Certificate Fee is payable at the time of Code Compliance Certificate application, and at the rate as shown in the Regulatory Fees and Charges schedule at that time.

Consent issued	____/____/____
Receipt No	_____
Issued by	_____ (GEMS CODE)

District Plan compliance is assessed separately with the PIM application. You should refer to the PIM to identify all requirements in terms of District Plan matters. If amendments are made to the PIM as a result of resolving District Plan issues a new Building Consent application may be required.

Yours faithfully



**Jacqueline Mutepfa**  
**PROCESS SUPPORT**  
(Copy sent to owner)

**COPY**

# TAX INVOICE

**GST Registration Number**

**52-211-247**

**NEW ZEALAND HOUSING FOUNDATION**  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

**Date:** 28 September 2009  
**Customer No:** 302176  
**Invoice No:** 433554

**Application Location:** 19 Titch Place, Glen Eden

**Application:** COM-2009-1374

Fee Code	Transaction Description	Amount
BLDL	Building Levy	401.09
BLDR	Building Research Levy	203.60

This account includes a total GST content of \$44.56

**Invoice Total** 604.69  
**Invoice Due** 12 October 2009

(Please Detach and return with payment)

**Invoice Date:** 28 September 2009

**Application:** DAP

**Invoice Number:** 433554

**Debtor Number:** 302176

**Name:** NEW ZEALAND HOUSING  
FOUNDATION

**Payment Reference:** 370179

**Application:** COM-2009-1374

**Invoice Total:** 604.69

# Code Compliance Certificate

Section 95, Building Act 2004  
(Form 7 – Building (Forms) Regulations 2004)

# COPY



Waitakere City Council  
*Te Taiao o Waitakere*

## THE BUILDING

Building consent number: COM-2009-1374

Date building consent issued: 23-Oct-2009

Street address: 19 Titch Place, Glen Eden

Legal description: Lot number and Deposited plan: LOT 32 DP 389289

Valuation number: 33650-27034

Current, lawfully established, use: Dwelling

Year first constructed: 2005-2010

## THE OWNER

Name of owner: New Zealand Housing Foundation

Mailing address: PO Box 44018, Point Chevalier, AUCKLAND 1246

Street address/Registered office: Bldg 55, Unitec Campus, Carrington Road, Mt Albert

Telephone no. (home): N/A

Telephone no. (work): 849 4395

Mobile number. (home): 027 5594524

Facsimile number. 849 4396

Email address: louise.d@housingfoundation.co.nz

## BUILDING WORK

The following building work is authorised by this building consent:

New five bedroom dwelling with attached (internal access)  
garage (Cat. 2).

Intended life: Indefinite

## CODE COMPLIANCE

The building consent authority named below is satisfied, on reasonable grounds, that:

☒ The building work complies with the building consent.

Signature: \_\_\_\_\_

Date: 16 April 2010

On behalf of Waitakere City Council

Print name: \_\_\_\_\_

**JOHN NICHOLLS**  
SENIOR PLUMBING & DRAINAGE INSPECTOR

Position: \_\_\_\_\_

Waitakere City Council  
Private Bag 93109  
6 Henderson Valley Rd  
Henderson  
WAITAKERE CITY  
Ph: 839 0400 Fax: 836 8001

# Checklist for the issuing of a Code Compliance Certificate

Note: This checklist makes up the requirement for what is to be kept on file in conjunction with checklist BCI-70.

Building Consent Number:

COM-2009-1374

SECTION A	1. Application for CCC received & complete; is CCC application fee paid?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	2. If applicable, has the Building final inspection passed?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	3. If applicable, has the P & D final inspection passed?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	4. CER inspection – have all certificates, etc been received and passed?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	5. Have any outstanding fees from Gems been paid (O Bal note)?	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> N/A
	6. If there are any outstanding fees and/or development contributions from Pathway, is the outstanding fee less than \$200.00? Customer phoned: <input type="checkbox"/> Y <input type="checkbox"/> N To pay electronically <input type="checkbox"/> / To pay on pick-up <input type="checkbox"/>	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N	<input type="checkbox"/> N/A
	7. If the consent was granted after 31 March 2005, is the CCC application within 2 years of the consent being granted?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	8. If the consent was granted after 31 March 2005 and has expired, has an extension of time been applied for?	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> N/A
	9. If this consent was approved after 1 July 2008, have the Inspection Fees been reconciled? <i>paid by X 15 @ \$13.00</i>	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	10. If there are any Amendments, have they been granted?	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> N/A
	11. If a CCTV was required, has clearance been received and EW fees invoiced?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> N/A
	12. Are all workflow tasks completed?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	
	13. Is the consent description correct?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	
	• E-mail records for file.	<input checked="" type="checkbox"/> Y		
	• Print field sheet and collate file.	<input checked="" type="checkbox"/> Y		
	• If applicable, send file for Commercial Review.	<input type="checkbox"/> Y		<input checked="" type="checkbox"/> N/A
CCC Application		Accept / Reject / Suspend		
Date		Name		

Did the Technical Review for the granting of a CCC pass?

☐ Y ☒ N

14. Check if the intended life has been specified as less than 50 years.	<input type="checkbox"/> yrs	<input checked="" type="checkbox"/> Indefinite
15. If this is part of a current subdivision, has the address been checked?	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N <input type="checkbox"/> N/A
16. Is there is a related requisition? (Put a note in Pathway to email Field Services when CCC issued.)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
17. Is there a related COA? (Building Construction Review Team Leader to advise wording to be added to CCC.)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
18. Are the Owners' details correct? (Update or add if required.)	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
19. Is a Compliance Schedule required?	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
20. Is a Septic Tank installation included?	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
21. Has a Certificate for Public Use previously been issued?	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
22. Will the building be included as part of the social infrastructure?	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
CCC Generated	✓ = 33650-27034	
Date	16.4.10	
	Name	

**Building Consent Status:** Construction Review

**Building Consent Issued:** 23/10/2009

**Property**

**Legal Desc** LOT 32 DP 389289

**Contact** NEW ZEALAND HOUSING FOUNDATION

**Address** 19 Titch Place Glen Eden

**Description** New five bedroom dwelling with attached (internal access) garage (Cat. 2).

**Amendments**

✓ B1

✓ B2

✓ B5

✓ B7

✓ B8

✓ B10

✓ B11

✓ B12

✓ B13

✓ B14

✓ B15

✓ P1

✓ P2

✓ P3

✓ P6

**COM-2009-1374**

**Expiry Date:** 16-Oct-2011

Date	Event	Description	Officer	Status / Result / Reason
12/04/2010 00:00:00 26818/2009	CER Certificates	<p>RECEIVED:</p> <ul style="list-style-type: none"> <li>✓ 1. Plumbers Form - 12/11/09</li> <li>✓ 2. Drainlayers Form - 12/11/09</li> <li>✓ 3. Manufacturers Certificate for Timber Treatment and Grading - 10/12/09</li> <li>✓ 4. Manufacturers Certificate and Layout for Roof Trusses - 10/12/09</li> <li>✓ 5. Soil/Geotechnical Engineers Certificate - 25/02/10</li> <li>✓ 6. Engineers Certificate for Foundations (Structural) - 25/02/10</li> <li>✓ 7. Engineers Certificate for A/B Grade Masonry - 25/02/10</li> <li>✓ 8. Engineers Certificate for Speciality Slab - 25/02/10</li> <li>✓ 9. Surveyors Certificate for Siting - 25/02/10</li> <li>✓ 10. Electrical Certificate - 25/02/10</li> <li>✓ 11. I have viewed the post constructions CCTV video on ww drain. The drain is in an acceptable condition in relation to the building works.</li> </ul> <p>The CCTV reveals that the manhole located close to the boundary with No 17 is buried. The manhole lid level is required to be raised or the surrounding ground level lower to match.</p> <p>The building consent condition relating to the post construction CCTV is not been satisfied. Okay as per notes on P6 12.04.10</p> <p>I have completed the QA-PSCCTV task. ECOWATER</p> <ul style="list-style-type: none"> <li>12. As-Built - Drainage - 12.04.10</li> <li>13. As-Built - Pre-floor - 12.04.10</li> </ul>		<div style="border: 1px solid black; border-radius: 50%; padding: 20px; text-align: center; width: 200px; margin: 0 auto;"> <p>Paid pr x 15</p> </div> <div style="border: 1px solid black; border-radius: 50%; padding: 20px; text-align: center; width: 200px; margin: 20px auto;"> <p>Refund x 2.</p> </div>
12/04/2010 00:00:00 7728/2010	P06 Final Plumbing and Drainage	<p><i>N/C</i></p> <p>Certificates or Producer Statements Required:</p> <p>AS-BUILT - PRE-FLOOR</p> <p>AS BUILT DRAINAGE PLAN</p> <p>/PM</p> <p>Contact Person: Lance (site manger)</p> <p>Contact Number: 021750280</p> <p>Additional Information: plans on site, cert advised, cancellation fee advised.</p>	John Nicholls	<p>Passed</p> <p>1. Confirmed with Ecowater that the manhole lid hasbeen exposed. 2. CCTV is okay as per Jason Lim.</p>
24/03/2010 12:30:00 24829/2009	P06 Final Plumbing and Drainage	<p>Certificates or Producer Statements Required:</p> <p>AS-BUILT - PRE-FLOOR</p> <p>AS BUILT DRAINAGE PLAN</p> <p>/PM</p> <p>Contact Person: Lance (site manger)</p> <p>Contact Number: 021750280</p> <p>Additional Information: plans on site, cert advised, cancellation fee advised.</p>	John Nicholls	<p>Failed</p> <p>CCTV to come as per condition 25 (DE1).</p>
24/02/2010 12:00:00 24442/2009	B15 Final Building	<p>Certificates or Producer Statements Required:</p> <p>/PM</p> <p>Contact Person: Lance (site manger)</p> <p>Contact Number: 021750280</p> <p>Additional Information: plans on site, cancellation fee advisd</p>	Andrew Collier	<p>Passed</p> <p>1. All Ok for CCC.</p>

**COM-2009-1374**

**Expiry Date: 16-Oct-2011**

Date	Event	Description	Officer	Status / Result / Reason
24/02/2010 00:00:00 3841/2010	B12 Pre-line Building	Certificates or Producer Statements Required:	Andrew Collier	Passed NO CHARGE 1. All items from 21/01/10 Ok. 2. Bottom stair riser is 2005mm from glass, so Ok.
04/02/2010 14:00:00 24441/2009	B14 Gibnail	Certificates or Producer Statements Required:  AM Contact Person: Anthony Contact Number: 021975612 Additional Information:	Andrew Collier	Passed 1. All Ok.
21/01/2010 12:00:00 24438/2009	B12 Pre-line Building	Certificates or Producer Statements Required: SOIL/GEOTECHNICAL ENGINEERS CERTIFICATE (STRUCTURAL) ENGINEERS CERTIFICATE FOR A/B GRADE MASONRY ENGINEERS CERTIFICATE FOR SPECIALITY SLAB SURVEYORS CERTIFICATE FOR SITING  AM Contact Person: ANTHONY (BUILDER) Contact Number: 021975612 Additional Information: PLANS ONSITE	Andrew Collier	Failed 1. Safety glass upstairs bathroom with 1.5m of FFL. 2. Safety glass upper panel at bottom of stairs. 3. Check on final.
21/01/2010 00:00:00 1480/2010	B07 Framing	Certificates or Producer Statements Required:	Andrew Collier	Passed NO CHARGE 1. All items complete from 10/12/09.
19/01/2010 09:00:00 24827/2009	P02 Pre-line Plumbing	Certificates or Producer Statements Required:  AM Contact Person: Peter - Plumber Contact Number: 0274969499 Additional Information: plans onsite	Phillip Tozer	Passed 1. Waste and layout as per plan. 2. Test and gauge on.
18/12/2009 08:00:00 24436/2009	B10 Cladding - Brick Veneer	Certificates or Producer Statements Required:  AM Contact Person: Paul Contact Number: 0212626486 Additional Information: plans onsite	Andrew Collier	Passed 1. Ok to 1/2 high.
16/12/2009 10:00:00 24431/2009	B08 Building Wrap and Cavity	Certificates or Producer Statements Required:  AM Contact Person: Anthony - Builder Contact Number: 021975612 Additional Information: Plans on site - aware of the cancellation procedures.	Andrew Collier	Passed 1. Ok to clad.

**COM-2009-1374**  
**Expiry Date: 16-Oct-2011**

Date	Event	Description	Officer	Status / Result / Reason
10/12/2009 11:30:00 24430/2009	B07 Framing  ✓	<p>Certificates or Producer Statements Required:</p> <p>AM  Contact Person:Antony  Contact Number: 021 975 612  Additional Information: Plans and xconditions on site</p>	David Ellery	<p>Passed</p> <p>*1. Complete nogs for apron flashing support *2. fit U/S x 3 to garage door lintel *3. brace B25 change to braceline ok *4. received frame and truss certificate. otherwise all ok to wrap *5. Manufacturers Certificate for Timber Treatment and Grading - 10-12-09 *6. Manufacturers Certificate and Layout for Roof Trusses -10/12/09</p>
26/11/2009 13:30:00 26618/2009	P03 Drainage  <i>Invoked ✓</i>	<p>Certificates or Producer Statements Required:</p> <p>PM  Contact Person:Brian  Contact Number:0275347500 (plumber/drainlayer)  Additional Information:</p> <p>Cancellation details: 9/11/09 As per Inspector Murray Norris, Wrong Job. Please note this job was not booked in. Plumber did not want this inspection. No charge please.</p> <p>PM  Contact Person: Brian Chapman (Plumber/Drainlayer)  Contact Number: 0275 347 500  Additional Information:</p>	John Nicholls	<p>Passed</p> <p>1. S/W only 2. Sewer done with Prefloor inspection 3. As built Drainage plan to come @ finalAdditional Inspection charged = # 441883</p>
19/11/2009 15:00:00 24429/2009	B05 Specialty Slab  ✓	<p>Certificates or Producer Statements Required:</p> <p>PM  Contact Person: Jason (flooring contractor)  Contact Number:021 765 439  Additional Information:Plans onsite</p>	Andrew Collier	<p>Passed</p> <p>1. Slab ok</p>

**COM-2009-1374**

**Expiry Date: 16-Oct-2011**

Date	Event	Description	Officer	Status / Result / Reason
12/11/2009 09:30:00 24828/2009	P03 Drainage	<p>Certificates or Producer Statements Required:</p> <p>/PM Contact Person: Brian Chapman Contact Number: 0275 347 500 Additional Information:</p> <p>Cancellation details: As per Inspector Murray Norris, wrong job. This was booked incorrectly. Consent # was 2009-1136 for another location. NO charge please.</p> <p>AM- first inspection in morning if possible Contact Person: Bryan- Contractor Contact Number: 027 534 7500 Additional Information: Plans on site.</p> <p>Caller originally mentioned 2008-1464 as the consent number- however that was a cancelled consent. Booking under this consent was chosen, as this was the most recent consent number under address</p>	John Nicholls	<p>Passed</p> <p>1. S/S only. 2. Stormwater to come.</p>
12/11/2009 00:00:00 24826/2009	P01 Pre-Floor Plumbing	<p>Certificates or Producer Statements Required:</p>	John Nicholls	<p>Passed</p> <p>Passed.</p>
10/11/2009 11:00:00 24428/2009	B02 Reinforced Concrete and Block Work	<p>Certificates or Producer Statements Required:</p> <p>AM/ Contact Person: Paul (bricklayer) Contact Number: 0212626486 Additional Information: plans on site</p>	Andrew Collier	<p>Passed</p> <p>1. Ok to fill firewall.</p>
04/11/2009 14:00:00 24345/2009	B01 Siting and Foundations	<p>Certificates or Producer Statements Required:</p> <p>PM Contact Person: Jason - Contractors Contact Number: 021765439 Additional Information: Plans on site - aware of cancellation procedures</p>	Andrew Collier	<p>Passed</p> <p>1. Ok to pour firewall footing and three piles to slab perimeter.</p>
	PS4 Prod. Stat. Req'd-(Council must still inspect)	<p>Certificates or Producer Statements Required:</p> <p>1. Rib-raft Foundation Slab</p>		

# Application for code compliance certificate

Section 92, Building Act 2004  
(Form 6 – Building (Forms) Regulations 2004)

Building consent number: Com-2009-1374

Issued by: **Waitakere City Council**



49521

Counter Services

14 APR 2010

## Location of building (please tick)

☐ Auckland ☐ Manukau ☒ Waitakere ☐ North Shore ☐ Papakura ☐ Rodney ☐ Franklin

THE OWNER	AGENT
Name of owner: <u>New Zealand Housing Foundation</u> <small>(Include preferred form of address, eg, Mr, Miss, Dr, if an individual)</small>	<small>(Only required if application is being made on behalf of the owner)</small> Name of agent: _____
Mailing address: <u>PO Box 44018</u> <u>Point Chevalier</u> <u>Auckland 1246</u>	Mailing address: _____ _____ _____
Street address: (for courier) <u>Bldg 55, Unilever Campus</u> <u>Carlington Road</u> <u>Mt Albert</u>	Street address: (for courier) _____ _____ _____
Telephone No: (Home): _____	Telephone No: (Home): _____
Telephone No: (Work): <u>8494395</u>	Telephone No: (Work): _____
Mobile number: <u>0075594534</u>	Mobile number: _____
Facsimile number: <u>8494396</u>	Facsimile number: _____
Email address: <u>louis@dohausyfoundation.co.nz</u>	Email address: _____
Evidence of ownership: (copy of certificate of title, lease, agreement for sale & purchase or other document showing full name of legal owner(s) of the building should be attached)	Relationship to owner: (state details of the authorisation from the owner to make the application on the owner's behalf) _____ _____
Signature of owner: <u>[Signature]</u>	Signature of agent: _____
Print name: <u>Louise Dunn</u>	Print name: _____

**FIRST POINT OF CONTACT FOR COMMUNICATION (Must be in New Zealand)**

(if first point of contact for communications from the council is different to above, please provide full name, mailing address, phone numbers and email addresses)

Full name:

as above

Mailing address:

Street address/Registered office:

Telephone no. (home):

Telephone no. (work):

Mobile number. (home):

Facsimile number:

Email address:

**APPLICATION**Stage 1 of an intended 1 StagesAll building work to be carried out under the above building consent was completed on: 24/2/10**KEY CONTACTS/PERSONNEL WHO CARRIED OUT THE BUILDING WORK**

<b>Designer or Architect</b>		<b>Structural Engineer</b>	
Business/Name:		Business/Name:	
Address:		Address:	
Daytime:	After Hours:	Daytime:	After Hours:
Mobile:	Fax:	Mobile:	Fax:
Registration/Qualifications:		Registration/Qualifications:	
<b>Builder</b>		<b>Plumber</b>	
Business/Name:		Business/Name:	
Address:		Address:	
Daytime:	After Hours:	Daytime:	After Hours:
Mobile:	Fax:	Mobile:	Fax:
Registration/Qualifications:		Registration/Qualifications:	
<b>Drainlayer</b>		<b>Electrician</b>	
Business/Name:		Business/Name:	
Address:		Address:	
Daytime:	After Hours:	Daytime:	After Hours:
Mobile:	Fax:	Mobile:	Fax:
Registration/Qualifications:		Registration/Qualifications:	
<b>Head Contractor/Site Manager</b>		<b>Other</b>	
Business/Name: <u>Caldsmith Developments</u>		Business/Name:	
Address:		Address:	
Daytime:	After Hours:	Daytime:	After Hours:
Mobile: <u>021 750980</u>	Fax:	Mobile:	Fax:
Registration/Qualifications:		Registration/Qualifications:	

☐ No specified system installed

(tick)	SPECIFIED SYSTEM
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1.0 Automatic systems for fire suppression 1.1 Automatic sprinkler systems 1.2 Gas and foam flood or deluge system, dry and wet chemical extinguishing systems
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	2.0 Automatic/manual emergency warning systems for fire or other dangers 2.1 Emergency warning systems including manual and automatic fire alarms, heat detectors, halon, gas, radiation systems. Are they audible or visual signals? 2.2 Automatic gas leak detection systems for the detection and measurement of combustible gases
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3.0 Electromagnetic or automatic doors or windows 3.1 Automatic doors (sliding/revolving/panic) 3.2 Access controlled doors (swipe card/key pad/sensor/delayed egress) 3.3 Interfaced fire or smoke doors or windows (electromagnetic door holders)
<input type="checkbox"/>	4.0 Emergency lighting systems. Stand-by generator, self-contained units, other
<input type="checkbox"/>	5.0 Escape route pressurisation. Location of control panel
<input type="checkbox"/>	6.0 Riser mains for fire service use. Physical location of the riser, point of entry for fire service etc.
<input type="checkbox"/>	7.0 Any automatic back-flow preventer connected to a potable water supply. Type of device and location (testable device)
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	8.0 Lifts, escalators or travelators or other systems for moving people or goods within buildings: Specify number of lifts and location. 8.1 Passenger carrying lift 8.2 Goods lift 8.3 Escalators and moving walks
<input type="checkbox"/> <input type="checkbox"/>	9.0 Mechanical ventilation or air conditioning system. Owners operation manual may have maintenance provisions included. <b>Note:</b> Cooling tower installed?
<input type="checkbox"/>	10.0 Building maintenance units for providing access to the exterior and interior walls of buildings.
<input type="checkbox"/>	11.0 Laboratory fume cupboards. Location: _____
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	12.0 Audio loops or other assistive listening systems 12.1 Audio loop 12.2 FM radio-frequency systems and infrared beam transmission systems.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	13.0 Smoke control systems: - 13.1 Mechanical smoke control 13.2 Natural smoke control 13.3 Smoke curtains
<input type="checkbox"/>	14.0 Emergency power systems or signs relating to a specified system in any of the specified systems 1.0-13.0. See 15.4, Signs
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	15.0 Means of escape: 15.1 System for communicating information for evacuation 15.2 Final exits 15.3 Fire separation 15.4 Signs. Such signs as required by • the building code (all systems above) • section 120 of the Building Act 2004 15.5 Smoke separation
<input type="checkbox"/>	SS16 Cable cars
<input type="checkbox"/>	The compliance schedule for this building complies with section 103(d) of the Building Act 2004

## REQUEST

I request that you issue a code compliance certificate for this work under section 95 of the Building Act 2004.

The code compliance certificate should be sent to:

Name: New Zealand Housing Foundation ☒ Owner ☐ Agent

Address: PO Box 44018, Point Chevalier, Auckland 1246

Owner/agent signature: [Signature]

Date: 23/3/10

Print name: Louise Dunn

If you are signing this application on behalf of a company/trust/other entity (the Applicant), you represent that you are authorised on behalf of the Applicant to make such application.

## ATTACHMENTS

The following documents are attached to this application:

- ☐ Certificates from the personnel who carried out the work
- ☐ Certificates that relate to the energy work
- ☐ Evidence that specified systems are capable of performing to the performance standards set out in the building consent
- ☐ Other (specify): \_\_\_\_\_

## IMPORTANT PRIVACY INFORMATION

If you would like to request access to, or correction of, your details, please advise us on the contact details below

Waitakere City Council  
Private Bag 93109  
6 Henderson Valley Rd  
Henderson  
WAITAKERE CITY  
Ph: 839 0400 Fax: 836 8001

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	
Field Services	
COUNTER	

## Nicole Daniels

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**From:** Nicole Daniels  
**Sent:** Friday, 16 April 2010 11:01 a.m.  
**To:** 'louise.d@housingfoundation.co.nz'  
**Subject:** COM-2009-1374, 19 Titch Place, Glen Eden

**Attachments:** img-4161045-0001.pdf



img-4161045-0001.  
pdf (640 KB)

Hi Louise,

See attached, I have received your CCC application for COM-2009-1374, 19 Titch Place, Glen Eden and have started the first part of the CCC Checklist and part of our process is to do a reconciliation. Originally 15 Base Inspection were paid for however, only x 13 inspections were undertaken, which results in a refund of \$356.00 (C/N # 520445). However the CCTV Ecowater Clearance has been Invoiced \$266.00 (Inv # 456863), I noticed that this was only Invoiced 12/4/2010 so was showing as outstanding, now that I have done the reconciliation resulting in a refund this has come off the credit leaving a balance of \$90.00 that will be refunded back to you within 14 days. Please don't pay Invoice # 456863 \$266.00.

I have posted the original out to you.

Please feel free to contact me if you require any further assistance.

Regards,

Nicole Daniels  
Process Support Assistant | Inspections  
Consent Services | City Services

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Waitakere City Council  
Phone: 836-8000 ext: 8102 | Fax: 836-8001  
Email: nicole.daniels@waitakere.govt.nz  
Address: 6 Henderson Valley Road, HENDERSON  
Postal: Private Bag 93109 HENDERSON 0650

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P Please consider the environment before printing this e-mail

-----Original Message-----

From: Xerox Scanner account  
Sent: Friday, 16 April 2010 10:45 a.m.  
To: Nicole Daniels  
Subject: Scan Data from MFDL13

Number of Images: 4  
Attachment File Type: PDF

Device Name: ApeosPort-II C6500  
Device Location:

# Checklist for the granting of a Code Compliance Certificate

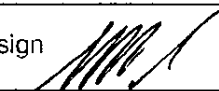
Note: This checklist makes up the requirement for what is to be kept on file in conjunction with checklist BCI-40.

**Building Consent Number:** COM-2009-1774

Check if the building work completed complies with the approved building consent and conditions on file	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A
In case of a compliance schedule check to ensure that the specified systems meet the required performance standards and all IQP statements have been provided	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
Check if all producer statements received are acceptable under the producer statement register	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A
Check if the energy work certificate has been provided (section 94(3))	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A
Check to make sure that any amendments have been granted, & whether documentation associated with these has been properly completed	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
Check if any warnings or bans have been applied (section 94(2))	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
<b>Check if there are any outstanding documents still to be collected:</b>	
Survey Certificates:	
<input type="checkbox"/> Height in relation to boundary	<input type="checkbox"/> Siting
<input type="checkbox"/> Maximum height of building	<input type="checkbox"/> Minimum floor level
<input type="checkbox"/> Emergency warning systems	<input type="checkbox"/> Concrete strength
<input type="checkbox"/> Mechanical ventilation	<input type="checkbox"/> Fire doors
<input type="checkbox"/> Foundation observation	<input type="checkbox"/> Spread of flame
<input type="checkbox"/> Ground conditions	<input type="checkbox"/> Backflow
<input type="checkbox"/> Masonry – A or B grade	<input type="checkbox"/> Compaction
<input type="checkbox"/> Lifts (electrical and installation)	<input type="checkbox"/> Pile driving
<input type="checkbox"/> Drain layer's and plumber's form	<input type="checkbox"/> Waterproofing
<input type="checkbox"/> Framing treatment level and location plans	<input type="checkbox"/> As built drainage plan
<input type="checkbox"/> Engineer's certificate for storm water disposal system	<input type="checkbox"/> Structural reviews
<input type="checkbox"/> On-site storm water treatment system certificate	<input type="checkbox"/> Site welding
<input type="checkbox"/> On-site waste water treatment system certificate	<input type="checkbox"/> Glazing
<input type="checkbox"/> Electrical or gas energy work certificates	<input type="checkbox"/> Drainage
<input type="checkbox"/> Installer's PS3 for on-site waste water installation	<input type="checkbox"/> Truss layout
<input type="checkbox"/> Smoke alarms and sprinklers	<input type="checkbox"/> Home heating (fires)
<input checked="" type="checkbox"/> Cadastral plan for drainage	<input type="checkbox"/> Other:

Please record reasons for granting or refusing the CCC:

As per approved plans

All inspections have been passed and all complying producer statements and certificates have been received, OK to issue CCC		<u>Yes</u> / <del>No</del>
Date	<b>16 APR 2010</b>	Name <b>PETER PROCTOR</b> SENIOR BUILDING INSPECTOR
		sign 

# WCC Record of inspection Final plumbing and drainage (P6)

ENTERED

Surveyor's Name	John Nicholls	Time in	
Date	12-4-10	Time out	
ABA #	Com-2009-1374	Time total	
Address	19 Titch place, Glen Eden.		

Certificates & forms							
Septic tank	Y	N	N/A	Stormwater tanks	Y	N	N/A

Hot water source	Gas	Electric	Temperature		HWC	Capacity	Tempering valve	Y	N	N/A
------------------	-----	----------	-------------	--	-----	----------	-----------------	---	---	-----

<b>Exterior</b>							
Gas Bottles restrained & supported on pad	Y	N	N/A	Spouting	Y	N	N/A
Water meter / supply pipe	Y	N	N/A	Pipe penetrations / clips	Y	N	N/A
Gully location / height above finished GL	Y	N	N/A	Terminal vent	Y	N	N/A
Discharge pipes	Y	N	N/A	Manholes (Correct ground level)	Y	N	N/A
Downpipes / spreaders	Y	N	N/A	Dry chambers / Inspection chambers	Y	N	N/A
Parapet / gutters drainage	Y	N	N/A	Cess pits	Y	N	N/A
Balcony drainage	Y	N	N/A	Half-siphon bends	Y	N	N/A
				Solar Heating / Panel, etc.	Y	N	N/A

<b>Interior</b>							
HWC - restraint	Y	N	N/A	Bidets / Spa baths / bath	Y	N	N/A
HWC - access	Y	N	N/A	Air-admittance valve	Y	N	N/A
TPR & relief valves and drains	Y	N	N/A	Sprinklers	Y	N	N/A
Showers tested	Y	N	N/A	Fire collars	Y	N	N/A
Sanitary fittings sealed & secured	Y	N	N/A	Wetbacks - Open vent	Y	N	N/A
WC's - water seal / dual flush	Y	N	N/A	Pool - backwash - to gully traps	Y	N	N/A
Tap hardware	Y	N	N/A				

<b>Backflow Preventer Device details</b>							
Testable device(s)	Interior	Exterior		Devices total			
Non-testable device(s) or Air gap(s)	Y	N		Hazard	High	Medium	Low
Description:							
Location:							

<b>Stormwater Tanks / Devices</b>										
Type of Device/s:	Retention tank	<input type="checkbox"/>	Detention tank	<input type="checkbox"/>	Rain garden	<input type="checkbox"/>	Swale/filter strip	<input type="checkbox"/>		
	Permeable paving	<input type="checkbox"/>	Dispersal device	<input type="checkbox"/>	Soakage pit / trench	<input type="checkbox"/>				
	Other (specify):									
If tank, is it - Buried <input type="checkbox"/> Above ground <input type="checkbox"/>										
Operation and maintenance manual received?				Y	N	N/A	Producer Statement (PS4) received?	Y	N	N/A

🔑 **IMPORTANT: Please complete back page ... →**

# WCC Record of inspection Final plumbing and drainage (P6)

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/>	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/> All previous inspections passed: Y / N All Certs requested have been received Y / N	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Certificates Required Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list <input type="checkbox"/> Y <input type="checkbox"/> N	

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>PLUMBING &amp; DRAINAGE</b>					
As-Built: Drainage <input checked="" type="checkbox"/> Pre-floor <input checked="" type="checkbox"/> Waste-Water <input type="checkbox"/>		<input checked="" type="checkbox"/>	Backflow Preventer Test Certificate		
Plumbers Form			Installers Certificate for Backflow Preventer		
Drainlayers Form			Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation			EcoWater Conditions		
Installers Certificate for Waste-Water Installation			Licensed Cadastral Surveyors As-Built		
Waste-Water Maintenance Service Contract			<b>ENGINEERS (PS4)</b>		
Quality Assurance Certificate			Eng Cert for Stormwater Mitigation Devices		
Solar Heating Certificate			Other:		
Gas Certificate			Other:		
Other:			Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE _____ INSPECTION.					

List of non-compliances / comments

Confirmed that the manhole lid <sup>has been</sup> ~~is~~ exposed  
and ~~the lid~~

CCTV is OK as per Jason Lin

Signed by: **ATTENTION INSPECTION SUPPORT:**

Is there a Backflow Prevention Device, has EcoWater been emailed?

YES

NO

**ATTENTION INSPECTION SUPPORT:**

Is there a Stormwater Device, has EcoWater been emailed?

YES

NO

NV#451801

2009-1374

ENTERED

BCI-38

WCC Record of inspection  
Final building (B15)

Surveyor's Name	ANDREW COLLIER	Time in	10.39
Date	24 FEB 2010	Time out	11.17
ABA #	09 - 1374.	Time total	38min
Address	19 TITCH PLACE -		

Building type	<input checked="" type="radio"/> Residential	<input type="radio"/> Outbuilding	<input type="radio"/> Retaining walls
---------------	--	-----------------------------------	---------------------------------------

<b>Exterior</b>			
Elevations as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Materials as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
FFL vs. GL clearances	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Grade and threshold	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Slip resistance - main entry	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Cladding to ground clearance/ weep holes	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Flashings windows & doors / sealed, clean	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Spouting / fascia clearances	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Paint, etc completed behind spouting	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Painting & general finishing details	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Flashing to meters / alarms / fans / etc	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Penetrations - wall	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Pergola / carport - clearance and connection details	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Pergola / carport - timber treatment	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Pergola / carport - timber size, span, spacing & fixings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - clearance and connection details	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - timber treatment	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - timber size, span, spacing & fixings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - step in floor level	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - clearance between claddings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Decks - barrier heights and construction	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Steps - landings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Landings / steps - slip resistance	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Handrail to steps	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Steps uniformity <100mm gap between risers	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Retaining walls - part of consent	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Retaining walls - barrier	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Roof / apron flashings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Penetrations - roof	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
TV / Sky dishes	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

<b>Subfloor</b>			
Access	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ventilation	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Crawlspace	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Cross-flow	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Durability of connections	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bracing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Insulation	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
DPM - ground / structure (Bearers, joists, piles etc ...)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

<b>Interior</b>			
Layout as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Light and ventilation	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Glazing / safety glass showers and skylights	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Window stays	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Wet areas - floors	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sealed at all junctions	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Wet areas - walls	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sealed at all junctions	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Wet areas - shower	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sealed at all junctions	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Kitchen	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sealed at all junctions	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Laundry	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sealed at all junctions	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stairs - head height	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stairs - uniformity	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stairs - landing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stairs - barrier height	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stairs - handrail	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Smoke alarms - in or within 3.0m bedrooms	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Smoke alarms all exist	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Smoke alarms - hush facilities	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stove installed	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ceiling access - all levels	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ceiling access - size	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ceiling insulation fitted - type	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Insulation clear of downlights	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Insulation clear of combustible surfaces	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Extraction fans ducted to outside air	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Laundry floor coverings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Extraction fans - bathroom	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Extraction fans - ensuite	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Extraction fans - kitchen	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Extraction fans - laundry	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - upper floors - FFL	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - height	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - cladding clearance	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - penetrations	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - slope on floor	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Balcony - slope on all surfaces	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-38

July 2009

BCI-38

# WCC Record of inspection Final building (B15)



<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/>	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> All previous inspections passed: <input checked="" type="checkbox"/> N All Certs requested have been received: <input checked="" type="checkbox"/> Y/N	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Certificates Required Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

<b>Producer statement check</b> Author on approved list <input type="checkbox"/> Y <input type="checkbox"/> N	<b>Engineer's name:</b>
--	-------------------------

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate		<input checked="" type="checkbox"/>	Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)		<input checked="" type="checkbox"/>	Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving		<input checked="" type="checkbox"/>	Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry		<input checked="" type="checkbox"/>	<b>OTHER</b>		
Engineers Certificate for Speciality Slab		<input checked="" type="checkbox"/>	Electrical Certificate		<input checked="" type="checkbox"/>
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting		<input checked="" type="checkbox"/>	Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		

## List of non-compliances / comments

ALL OK FOR C.C.C.

Signed by: \_\_\_\_\_

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-38

July 2009

## PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

ISSUED BY: Wilton Joubert Ltd.

TO: Goldsmith Developments

TO BE SUPPLIED TO: Waitakere City Council

IN RESPECT OF: Pre slab - excation; Piling; Raft Floor

AT: Lot 32, 19 Titch Place, Henderson, Auckland


*(Guidance: Press on the top of this form as printed on the reverse side)*  
*(Construction Review Firm)*

*(Owner/Developer)*

*(Building Consent Authority)*

*(Description of Building Work)*

*(Address)*

Engineers Certificate for:	30125 / GEOTECH +
SPECIALTY	SLAB
COM	09-1374
Signed:	

25 FEB 2010

LOT 32

DP 339810

SO

Wilton Joubert Ltd.

*(Construction Review Firm)*

has been engaged by Goldsmith Developments

 to provide ☒ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 *(Engineering Categories)* or ☐ OL1 ☐ OL2 ☐ OL3 ☐ OL4 *(Architectural Categories)*

 observation ☐ or other ..... services

*(Extent of Engagement)*

in respect of clause(s) B1 ..... of the Building Code for the building work described in documents relating to Building Consent No. COM20091374 ..... and those relating to Building Consent Amendment(s) Nos. .... issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variation(s) No. .... (copies attached) or by the attached Schedule ☐ have been issued during the course of the works.

On the basis of ☒ this ☐ these review(s) and information supplied by the contractor during the course of the works, I believe on reasonable grounds that ☐ All ☒ Part only of the building works have been completed in accordance with the relevant requirements of the Building Consents and Building Consent Amendments identified above, with respect to Clause(s) B1 / VM1 ..... of the Building Regulations.

I, Andrew Wilton

*(Name of Construction Review Professional)*

 am: ☒ CPEng No. 176859

☐ Reg Arch No. ....

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: BE MIPENZ CPEng IntPE DipMS

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

The Construction Review Firm is a member of ACENZ: ☐ YES ☒ NO

SIGNED BY Andrew Wilton ..... ON BEHALF OF Wilton Joubert Ltd.

Date: 24 Feb 2010

Signature:



*Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Construction Review Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000\*.*

This form to accompany Forms 6 or 8 of the Building (Form) Regulations 2004 for the issue of a Code Compliance Certificate.

## PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on the reverse side)

 ISSUED BY: Mitchell Vranjes Consulting Engineers Ltd

(Construction Review Firm)

 TO: Lance Goldsmith

(Owner/Developer)

 TO BE SUPPLIED TO: Dunstons City Council

(Building Consent Authority)

 IN RESPECT OF: Reinforcement to Block Walls & Block Wall Foundations

(Description of Building Work)

 AT: 19 Titch Pl.

(Address)

Glen Eden

 LOT 32

DP

SO

Mitchell Vranjes Consulting Engineers Ltd has been engaged by Lance Goldsmith

(Construction Review Firm)

 to provide ☐ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ OL1 ☐ OL2 ☐ OL3 ☐ OL4 (Architectural Categories)

 observation ☒ or other Reinforcement to Block Walls & Foundations only services

 in respect of clause(s) B/V M1

documents relating to Building Consent No. ....

Building Consent Amendment(s) Nos. ....

course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variation(s) No. ....

 or by the attached Schedule ☐ have been issued during the course of the works.

On the basis of ☒ this ☐ these review(s) and information supplied by the contractor during the course of the works, I believe on reasonable grounds that ☐ All ☒ Part only of the building works have been completed in accordance with the relevant requirements of the Building Consents and Building Consent Amendments identified above, with respect to Clause(s) ... of the Building Regulations.

 I, Narish Pandey am: ☒ CP Eng No. 216136

(Name of Construction Review Professional)

☐ Reg Arch No. ....

 I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: ME, MIPENZ, CEng

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

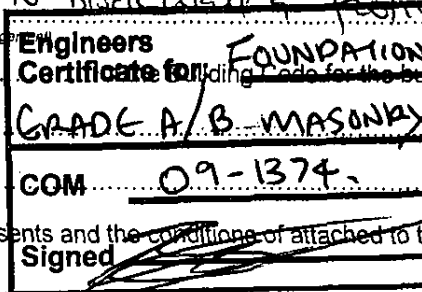
 The Construction Review Firm is a member of ACENZ: ☐ YES ☒ NO

 SIGNED BY: Narish Pandey ON BEHALF OF

 Date: 28.1.2010 Signature: N. Pandey

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Construction Review Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000\*.

This form to accompany Forms 6 or 8 of the Building (Form) Regulations 2004 for the issue of a Code Compliance Certificate.



Unit E3, 17 Corinthian Drive, Albany  
PO Box 32 073, Devonport 0744, Auckland  
Ph +64 9 414 7105, Fax +64 9 414 7109  
Mob 021 97 00 44  
Email: dturner@kardon.co.nz  
Website: www.kardon.co.nz

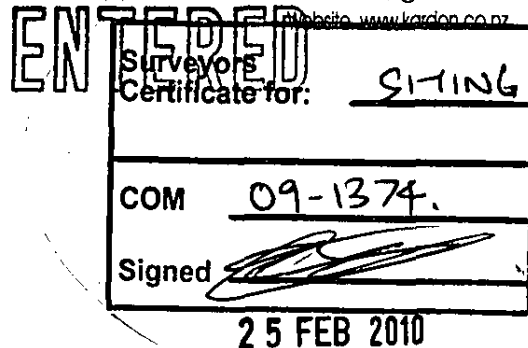
24 February 2010

Waitakere City Council  
Private Bag 93109  
Henderson  
Waitakere 0650  
Auckland

Attn: Building Consents Department  
Andrew Collier

Dear Sir

**RE: NEW DWELLING: LOT 32 – 19 TITCH PLACE,  
GLEN EDEN  
DP 339810 BC 2009-1374**



I, Donald Alistair Turner, Registered Professional Surveyor, hereby certify that the new dwelling built on the above allotment has been:

- (1) Sited correctly in relationship to the boundaries of the property.
- (2) Has the correct finished floor level being in accordance with the approved plans.

We also confirm that provided that the dwelling is erected in accordance with the approved Architects drawings that it will in turn be in accordance with the approved Land Use Consent.

Yours faithfully  
**KARDON CONSULTANTS LTD**

DA Turner  
Registered Professional Surveyor

# Electrical Certificate of Compliance

for prescribed electrical work that is carried out on electrical installations and involves the placing or positioning or the replacing or repositioning of conductors (including fittings attached to those conductors).  
**To be completed whether or not an inspection is required.**

No. **3055933**

No. of attachments

## CUSTOMER INFORMATION - PLEASE PRINT CLEARLY

Name of customer **Goldsmith developments**

Phone: **021 750 280**

Address of installation **4 Newfound way**

Postal address of customer (if not as above)

## WORK DETAILS

**34** No. of lighting outlets **1** No. of ranges

**27** No. of socket outlets **1** No. of water heaters

Was any installation work carried out by the homeowner? ☐ Yes ☒ No

Please tick (✓) as appropriate where work includes:

☒ Mains ☒ Main earthing system

☒ Switchboard ☒ Electric lines

Description **- New installation as above**

**- Down lights 109 out CA Rated**

**COM 09-1374**  
**25 FEB 2010**

It is recommended that test results be recorded here:

Visual Examination ☒

Earth Continuity ☒

Bonding ☒

Polarity ☒

Insulation Resistance **2** Mohm

Other

If necessary attach any pages with sketches of work done

## CERTIFICATION OF WORK

I certify that the above electrical work has been carried out in accordance with the requirements of the Electricity Act 1992 and Electricity Regulations 1997.

### ELECTRICAL WORKER DETAILS

Name **Andrew Tuckey**

Registration no. **E2186**

Company **TUCKEY ELECTRICAL & PLUMBING**

Signature **Andrew Tuckey**

Date **18/2/10**

Contact Ph No. **021 582517**

### CERTIFICATION OF ELECTRIC LINES

(to be completed where a separate electrical worker has installed the electric line portion of the mains)

Name

Registration no.

Company

Signature

Date

Contact Ph No.

## INSPECTION DETAILS Electrical work requiring inspection by a registered electrical inspector

☒ New mains ☒ Switchboard ☒ Earthing system ☐ Installation work in hazardous areas

I certify that the inspection has been carried out in accordance with the requirements of regulation 41 of the Electricity Regulations 1997.

Name **Martin Gedyer**

Registration no. **E832**

Signature **M. Gedyer**

Date **22-2-10**

Daytime Contact Ph No.

# ENTERED

2009-1374

BCI-35

## WCC Record of inspection Preline building (B12)



Surveyor's Name	ANDREW COLLIER	Time in	
Date	24 FEB 2010	Time out	N/A
ABA #	09-1374	Time total	
Address	19 TITCH PLACE		

Wind zone: low / medium / high / very high / specific Number of floors or levels inspected: (describe) 2

Wall framing:	M.C average _____ %		
All claddings finished	Y	N	N/A
Layout as per plan	Y	N	N/A
Windows as per plan	Y	N	N/A
Joinery labels sited	Y	N	N/A
Wind zone / manufacturer's details, etc	Y	N	N/A
Joinery - seals installed	Y	N	N/A
Restrictors fitted	Y	N	N/A
Safety glass fitted	Y	N	N/A
Stairs installed	Y	N	N/A
Head-height 2.1m	Y	N	N/A
Strapping to block walls	Y	N	N/A
Stairs uniform	Y	N	N/A
Landings provided	Y	N	N/A
Top plate size	Y	N	N/A
Holes & notches studs	Y	N	N/A
Holes & notches - plates	Y	N	N/A
Ceiling batten size, c/s & fixing	Y	N	N/A
Angle bracing - fixings / placement	Y	N	N/A
6Kn / 12Kn - internal walls	Y	N	N/A
Bottom plate fixings - internal walls	Y	N	N/A
Electrical fit-out completed	Y	N	N/A
Plumbing fit-out completed	Y	N	N/A
Moisture content 18% maximum - record average readings	Y	N	N/A
Wall insulation fitted correctly	Y	N	N/A
Treatment - wet areas / H/3 ply S/S fixings	Y	N	N/A

Inter-tenancy			
Single frame	Y	N	N/A
Double frame	Y	N	N/A
Insulation	Y	N	N/A
Floor separation	Y	N	N/A
Roof separation	Y	N	N/A
Subfloor separation	Y	N	N/A

Insulation			
Subfloor	Y	N	N/A
Block walls	Y	N	N/A
Walls	Y	N	N/A
Ceiling	Y	N	N/A
Thermal envelope	Y	N	N/A

Roof framing			
Spouting & downpipes installed (for weathertightness)	Y	N	N/A
Truss layout provided	Y	N	N/A
Truss layout as per plan	Y	N	N/A
Roof cladding completed	Y	N	N/A
Minimum roof pitch	Y	N	N/A
No damage to trusses	Y	N	N/A
Building paper if required (spreaders)	Y	N	N/A
Ceiling insulation installed correctly	Y	N	N/A

Result of inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

**IMPORTANT: Please complete back page ... ➔**

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-35

July 2009

# WCC Record of inspection Preline building (B12)

<b>Producer statement check</b>			<b>Engineer's name:</b>		
Author on approved list	Y	N			

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

List of non-compliances / comments

ALL ITEMS FROM 21/01/10 OK.  
 BOTTOM STAIR RISER IS 2005mm FROM GLASS, SO OK.  
 NO CHARGE.

Signed by: 

ENTERED

Com-2009-1374

BCI-115

# WCC Record of inspection Final plumbing and drainage (P6)



Surveyor's Name	JOHN NICHOLLS	Time in	12:20
Date	24.2.10	Time out	12:50
ABA #	09/1374	Time total	30
Address	19 Titchell Pl.		

Certificates & forms			
Septic tank	Y	N	N/A
Stormwater tanks	Y	N	N/A

Hot water source	Gas	Electric	Temperature	52.80	HWC	Capacity	80L	Tempering valve	Y	N	N/A
------------------	-----	----------	-------------	-------	-----	----------	-----	-----------------	---	---	-----

Exterior			
Gas Bottles restrained & supported on pad	Y	N	N/A
Water meter / supply pipe	Y	N	N/A
Gully location / height above finished GL	Y	N	N/A
Discharge pipes	Y	N	N/A
Downpipes / spreaders	Y	N	N/A
Parapet / gutters drainage	Y	N	N/A
Balcony drainage	Y	N	N/A
Spouting	Y	N	N/A
Pipe penetrations / clips	Y	N	N/A
Terminal vent	Y	N	N/A
Manholes (Correct ground level)	Y	N	N/A
Dry chambers / Inspection chambers	Y	N	N/A
Cess pits	Y	N	N/A
Half-siphon bends	Y	N	N/A
Solar Heating / Panel, etc.	Y	N	N/A

Interior			
HWC - restraint	Y	N	N/A
HWC - access	Y	N	N/A
TPR & relief valves and drains	Y	N	N/A
Showers tested	Y	N	N/A
Sanitary fittings sealed & secured	Y	N	N/A
WC's - water seal / dual flush	Y	N	N/A
Tap hardware	Y	N	N/A
Bidets / Spa baths / bath	Y	N	N/A
Air-admittance valve	Y	N	N/A
Sprinklers	Y	N	N/A
Fire collars	Y	N	N/A
Wetbacks - Open vent	Y	N	N/A
Pool - backwash - to gully traps	Y	N	N/A

Backflow Preventer Device details							
Testable device(s)	Interior	Exterior		Devices total			
Non-testable device(s) or Air gap(s)	Y	N		Hazard	High	Medium	Low
Description:							
Location:							

Stormwater Tanks / Devices							
Type of Device/s:	Retention tank	Detention tank	Rain garden	Swale/filter strip			
	Permeable paving	Dispersal device	Soakage pit / trench				
Other (specify):							
If tank, is it	Buried	Above ground					
Operation and maintenance manual received?	Y	N	N/A	Producer Statement (PS4) received?			
	Y	N	N/A				

⚡ IMPORTANT: Please complete back page ... →

## WCC Record of inspection

### Final plumbing and drainage (P6)

<b>Result of Inspection:</b>	
<b>Passed</b> <input type="checkbox"/>	<b>Failed</b> <input checked="" type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> All previous inspections passed: Y / N All Certs requested have been received Y / N	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Certificates Required Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>			<b>Engineer's name:</b>	
Author on approved list	Y	N		

CERTIFICATES		Required	Received	CERTIFICATES		Required	Received
<b>PLUMBING &amp; DRAINAGE</b>							
As-Built	Drainage <input type="checkbox"/>	Pre-floor <input type="checkbox"/>			Backflow Preventer Test Certificate		
Plumbers Form					Installers Certificate for Backflow Preventer		
Drainlayers Form					Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation					EcoWater Conditions		
Installers Certificate for Waste-Water Installation					Licensed Cadastral Surveyors As-Built		
Quality Assurance Certificate					<b>ENGINEERS (PS4)</b>		
Solar Heating Certificate					Eng Cert for Stormwater Mitigation Devices		
Gas Certificate					Other:		
Other:					Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE _____ INSPECTION.</b>							

### List of non-compliances / comments

CCTV to come as per Concl 25 DE1

**Signed by:**

<b>ATTENTION INSPECTION SUPPORT:</b>	Is there a Backflow Prevention Device, has EcoWater been emailed?	YES	NO
--------------------------------------	---	-----	----

<b>ATTENTION INSPECTION SUPPORT:</b>	Is there a Stormwater Device, has EcoWater been emailed?	<b>YES</b>	<b>NO</b>
--------------------------------------	--	------------	-----------

BCI-37

ENTERED

WCC Record of inspection  
Gibnail (B14)

  
Waitakere City Council  
Te Taitā o Waitākere

2009-1374

Surveyor's Name	ANDREW COLLIER	Time in	7.00
Date	04 FEB 2010	Time out	7.12
ABA #	09-1374	Time total	12 min
Address	19 TITCH PLACE.		

Wet areas: (record linings &amp; finish)

Wall lining: Villa board / Aqua-line / Gib-board / RPB / Elephant BD

Flooring: Concrete / H3.1 Plywood / Compressed fibre cement / Particle BD / F&amp;G timber

Bracing			
Nailing of bracing sheets	Y	N	N/A
No bracing sheets fitted behind shower or bath	Y	N	N/A
No openings in middle 1/3 of brace sheets	Y	N	N/A
No power points within 90mm of edge of brace sheets	Y	N	N/A
Floor diaphragm	Y	N	N/A
Ceiling diaphragm	Y	N	N/A
No openings in middle 1/3 of diaphragm	Y	N	N/A
Nailing 1 <sup>st</sup> layer of firewall	Y	N	N/A
Nailing 2 <sup>nd</sup> layer of firewall (sheets staggered)	Y	N	N/A
Nailing 1 <sup>st</sup> layer ceilings	Y	N	N/A
Nailing 2 <sup>nd</sup> layer ceilings (sheets staggered)	Y	N	N/A
Sealing of penetrations / acoustic and fire	Y	N	N/A
Power points & light fittings	Y	N	N/A
Downlights to be CA rated (thermal envelope not compromised)	Y	N	N/A
GIB sheets fixed at 100mm centres on all studs supporting tiles	Y	N	N/A

Customer advised waterproofing inspection required: Yes / No / N/A

Result of inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list	


**IMPORTANT: Please complete back page ... →**

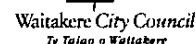
Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-37

July 2009

BCI-37


## Inspection



CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

## List of non-compliances / comments

All OK.



2009-1374

BCI-35

ENTERED

# CCC Record of inspection Preline building (B12)



Surveyor's Name	ANDREW COLLIER	Time in	11.07
Date	21 JAN 2010	Time out	11.39
ABA #	09-1374	Time total	32 min
Address	19 TITCH PLACE		

Wind zone: low / medium / high / very high / specific Number of floors or levels inspected: (describe) 2

Wall framing:				M.C average			
All claddings finished	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Layout as per plan	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Windows as per plan	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joinery labels sited	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind zone / manufacturer's details, etc	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joinery - seals installed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restrictors fitted	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety glass fitted	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stairs installed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Head-height 2.1m	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strapping to block walls	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stairs uniform	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landings provided	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Top plate size	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Holes & notches studs	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Holes & notches - plates	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ceiling batten size, c/s & fixing	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Angle bracing - fixings / placement	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
6Kn / 12Kn - internal walls	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bottom plate fixings - internal walls	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electrical fit-out completed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plumbing fit-out completed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moisture content	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
18% maximum - record average readings	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wall insulation fitted correctly	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treatment - wet areas / H/3 ply S/S fixings	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Inter-tenancy			
Single frame	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Double frame	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insulation	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floor separation	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roof separation	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Subfloor separation	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Insulation				
Subfloor	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	State type
Block walls	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	State type
Walls	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	State type
Ceiling	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	State type
Thermal envelope	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Describe envelope

Roof framing			
Spouting & downpipes installed (for weathertightness)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Truss layout provided	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Truss layout as per plan	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roof cladding completed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimum roof pitch	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
No damage to trusses	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Building paper if required (spreaders)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ceiling insulation installed correctly	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Result of inspection:
<b>Passed</b> <input type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)
<b>Failed</b> <input checked="" type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>
Issue Notice to Fix <input type="checkbox"/>
Field Note <input type="checkbox"/>
Failed Letter <input type="checkbox"/>
Amendments Required <input type="checkbox"/>
Additional Inspections Required: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

IMPORTANT: Please complete back page ... →

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-35

July 2009

# WCC Record of inspection. Preline building (B12)

Producer statement check		Engineer's name: <i>[Signature]</i>	
Author on approved list	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N		

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:					

## List of non-compliances / comments

- ① SAFETY GLASS UPSTAIRS BATHROOM WITH 1.5m OF FFL.  
 ② SAFETY GLASS UPPER PANEL AT BOTTOM OF STAIRS.  
 CHECK ON FINAL.

Signed by: 

BCI-30

ENTERED

# CCC Record of inspection Framing (B7)


 Waitakere City Council  
Te Taitahi o Waitakere

2009-1374

Surveyor's Name	ANDREW COLLIER	Time in	
Date	21 JAN 2010	Time out	N/A
ABA #	09-1374	Time total	
Address	19 TITCH PLACE		

 Wind zone: low / medium / high / very high / specific Number of floors or levels inspected: (describe) \_\_\_\_\_

General: If outcome is no (i.e. not approved), identify reasons in comment section below.				
Openings as per plan	Y	N	N/A	
Treatment type + grading	Y	N	N/A	
Stud - size & c/s	Y	N	N/A	
Stud heights	Y	N	N/A	
Lintel size	Y	N	N/A	
Lintel point loads	Y	N	N/A	
Lintel fixings (wind)	Y	N	N/A	
Bottom plate fixings - in general	Y	N	N/A	
Bottom plate - where face-fixed 6mm o/hang	Y	N	N/A	
Bottom plate fixings for bracing elements	Y	N	N/A	
Bottom plate DPC	Y	N	N/A	
Bottom plate to stud 6Kn & 12Kn connection	Y	N	N/A	
Top plate - size	Y	N	N/A	
Uplift requirements - truss / stud / plate / lintels / beams	Y	N	N/A	
Truss fixings as per M/F requirements	Y	N	N/A	
Truss to top plate connections	Y	N	N/A	
Purlin fixings / Tile battens	Y	N	N/A	
Ceiling plane bracing	Y	N	N/A	
Roof plane bracing	Y	N	N/A	
Flat strap bracing in pairs & taut	Y	N	N/A	
Dragon ties	Y	N	N/A	
Roof space braces	Y	N	N/A	
Rafter size, c/s, fixing	Y	N	N/A	
Ridge beam size & fixing	Y	N	N/A	
Parapet framing & fixings (slopes 15°)	Y	N	N/A	
Flashing support (nogs)	Y	N	N/A	
Angle braces	Y	N	N/A	
Sheet braces	Y	N	N/A	
Joist - size & c/s	Y	N	N/A	
C/L joist - treatment	Y	N	N/A	
C/L joist - flashings	Y	N	N/A	
Deck level - step & fall across deck	Y	N	N/A	
External rafters and beams H3.2	Y	N	N/A	
Fixing of ply bracing, decking, roof (S/S)	Y	N	N/A	

Inter-tenancy: If outcome is no (i.e. not approved), identify reasons in comment section below.				
Single frame	Y	N	N/A	
Double frame	Y	N	N/A	
Floor / roof separation	Y	N	N/A	
Subfloor separation	Y	N	N/A	

Result of inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

Producer statement check		Engineer's name:
Author on approved list	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	

**IMPORTANT: Please complete back page ... →**

 Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-30

July 2009

# WCC Record of Inspection Framing (B7)

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height In Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

## List of non-compliances / comments

ALL ITEMS COMPLETE FROM 10/12/09.  
NO CHARGE.

Signed by: 

# ENTERED

com - 2009 = 1374

BCI-112

## WCC Record of inspection Preline plumbing (P2)



Surveyor's Name	Phil Tozer	Time in	8.00
Date	19-01-10	Time out	8.45
ABA #	09-1374	Time total	0.75
Address	19 TITCH PLACE		

Certificates			
Registration checked	Y	N	Number
Method of test	Y	N	N/A
G12/AS1 1500kPa		AS3500 1500kPa	
NZS4763 1.5 times working pressure			

Water supply pipe: Polybutylene / Copper / Rehau / Other \_\_\_\_\_ System: G12 / AS3500

Number of floors or levels inspected: (describe) 2

General requirements			
Layout as per plan	Y	N	N/A
Materials as per plan	Y	N	N/A
Pipes clipped in ceiling space	Y	N	N/A
Pipes checked for rattle / hammer	Y	N	N/A
Pipework on test	Y	N	N/A
Holes and notches in top plates	Y	N	N/A
Water supply pipe size and length	Y	N	N/A
Holes and notches in joists	Y	N	N/A
Holes and notches in floor joists	Y	N	N/A
Floor waste - junctions installed correctly	Y	N	N/A
Floor wastes on test	Y	N	N/A
Fixture discharge pipe - size & gradient	Y	N	N/A
Fixture vents - size & gradient	Y	N	N/A
Pipe brackets secured to wall	Y	N	N/A
Pipes in subfloor secured to framing	Y	N	N/A
Pipe penetrations	Y	N	N/A
Flashings	Y	N	N/A
All materials compatible	Y	N	N/A
Decks & balconies - outlets and overflows	Y	N	N/A
Internal gutters - outlets and overflows	Y	N	N/A
Fire collars	Y	N	N/A
Sprinklers (tested to 1500kPa)	Y	N	N/A
Sprinklers - pipe diameter / flow rate	Y	N	N/A
Recycled water	Y	N	N/A

Result of Inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b> Author on approved list <input type="checkbox"/> Y <input type="checkbox"/> N	<b>Engineer's name:</b>
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**IMPORTANT: Please complete back page ... →**

# WCC Record of inspection Preline plumbing (P2)

CERTIFICATES		Required	Received	CERTIFICATES		Required	Received
<b>PLUMBING &amp; DRAINAGE</b>							
As-Built	Drainage <input type="checkbox"/>		Pre-floor <input type="checkbox"/>		Backflow Preventer Test Certificate		
Plumbers Form				✓	Installers Certificate for Backflow Preventer		
Drainlayers Form					Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation					EcoWater Conditions		
Installers Certificate for Waste-Water Installation					Licensed Cadastral Surveyors As-Built		
Quality Assurance Certificate					<b>ENGINEERS (PS4)</b>		
Solar Heating Certificate					Eng Cert for Stormwater Mitigation Devices		
Gas Certificate					Other:		
Other:					Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE <b>FINAL</b> INSPECTION.							

List of non-compliances / comments

Waste & Layout as per Plan.  
Test & gauge on.

Signed by: \_\_\_\_\_



ENTERED 9/13

COM-2009-1374

BCI-33

# WCC Record of inspection Cladding brick veneer (B10)



Surveyor's Name	ANDREW COLLIER	Time in	9.00
Date	18 DEC 2009	Time out	9.27
ABA #	09-1374	Time total	
Address	19 TITCH PLACE.		

Brick veneer - record type: clay / concrete / stone / schist Brand: MONIER

Zone: Seaspray / Zone 1

Type of inspection( circle ) : <u>Half Height</u> / 2nd level (slip joint) / Lintel / Shelf angle / Subfloor / Other				
Rebate flint-coated, min 50mm rebate	<input checked="" type="radio"/>	N	N/A	
Building paper tight and cut short of rebate	<input checked="" type="radio"/>	N	N/A	
Steps in split floor levels flashed	<input checked="" type="radio"/>	N	N/A	
Two ties within 300mm of rebate	<input checked="" type="radio"/>	N	N/A	
Maximum overhang 20mm	<input checked="" type="radio"/>	N	N/A	
Cavity 40mm min, 75mm max	<input checked="" type="radio"/>	N	N/A	
No services in cavity	<input checked="" type="radio"/>	N	N/A	
Cavity clean, washouts provided	<input checked="" type="radio"/>	N	N/A	
Inside face. Mortar not built up on ties. Dags not more than 5mm.	<input checked="" type="radio"/>	N	N/A	
Weepholes & vents size: 75mm high or vented 10mm gap continuous along top at soffit	<input checked="" type="radio"/>	N	N/A	
Weephole locations: every 3 <sup>rd</sup> perpend or 800 max (min 1000sq mm per linear metre of wall)	<input checked="" type="radio"/>	N	N/A	
Tie durability/size galv/stainless steel, min length 85mm upto 50mm cavity, 105mm min upto 70mm cavity. (for 70 series only. Refer NZS4210 for 90 series)	<input checked="" type="radio"/>	N	N/A	
Tie embedment: embedded at least half the width of the veneer with min 15mm cover to end	<input checked="" type="radio"/>	N	N/A	
Tie fixings: min 5 per sqm. 600 hori/350 vert, ties within 315 of slip joint, within 200mm of openings, 260ctrs vert over sloping shelf angles	<input checked="" type="radio"/>	N	N/A	
Openings and ends: must have ties within 200mm	<input checked="" type="radio"/>	N	N/A	
All ties screw fixed (check length if screwed into rigid backing)	<input checked="" type="radio"/>	N	N/A	
Mortar joints 7-13mm	<input checked="" type="radio"/>	N	N/A	
Mortar joints raked max 6mm and tooled	<input checked="" type="radio"/>	N	N/A	
Sealed at roof space	<input checked="" type="radio"/>	N	N/A	
230mm min. panels	<input checked="" type="radio"/>	N	N/A	
Ties every 2 <sup>nd</sup> brick	<input checked="" type="radio"/>	N	N/A	
Brick panels plumb and level.	<input checked="" type="radio"/>	N	N/A	
Control joints (for concrete bricks) refer manufacturer requirements.	<input checked="" type="radio"/>	N	N/A	
Junctions with other claddings: flexible sealant over backing rod.	<input checked="" type="radio"/>	N	N/A	
Bond breaker (slip joint) product used: Butynol / Nuraply / Supercourse / malthoid/ other				
Gable - framing @ 400mm c/s	<input checked="" type="radio"/>	N	N/A	
Gable - rigid air barrier or approved wrap.	<input checked="" type="radio"/>	N	N/A	
Weepholes & vents 75mm high @ 800ctrs max	<input checked="" type="radio"/>	N	N/A	
Type of lintel as per NZS3604 fixed to framing or self supporting	<input checked="" type="radio"/>	N	N/A	
Lintel angle fixings into framing 75mm x 10mm galv coach screws @ 400 ctrs. Timber lintel H3.1 min.	<input checked="" type="radio"/>	N	N/A	
Lintel angle self supported: brick support 100mm upto 2m span then 200mm over 2m span.	<input checked="" type="radio"/>	N	N/A	
Lintel angle upstand flashed back to wrap (using wrap / supercourse / metal flashing etc)	<input checked="" type="radio"/>	N	N/A	
Bolted lintels stop 5mm short of jamb bricks.	<input checked="" type="radio"/>	N	N/A	
Interstorey/ above roof shelf angle: fixing, size, seating:	<input checked="" type="radio"/>	N	N/A	
Row of ties directly above and below Slip joint:	<input checked="" type="radio"/>	N	N/A	
2 <sup>nd</sup> row of ties within 315mm of shelf angle/slip joint (interstorey)	<input checked="" type="radio"/>	N	N/A	
Two storey framing: min 90x45 studs @ 400ctrs max.	<input checked="" type="radio"/>	N	N/A	
Sill bricks: min 15deg slope, 30-50mm overhang	<input checked="" type="radio"/>	N	N/A	
Sill flashing drip edge 5mm into cavity, 200mm each side of opening	<input checked="" type="radio"/>	N	N/A	
Jamb flashing (150mm min) Supercourse to soffit	<input checked="" type="radio"/>	N	N/A	
Head flashing tight to bricks with stopends in cavity.	<input checked="" type="radio"/>	N	N/A	
Max Heights:				
Panel Height 4.0m	<input checked="" type="radio"/>	N	N/A	
7.0m height above ground	<input checked="" type="radio"/>	N	N/A	
5.5m gable end	<input checked="" type="radio"/>	N	N/A	
Wash outs every 10 bricks (good trade practice. Not compulsory)	<input checked="" type="radio"/>	N	N/A	
Timber subfloor: double ties within 300mm of bondbeam, ventilation, vermin proofing reqd where gaps greater than 13mm.	<input checked="" type="radio"/>	N	N/A	
Fire rating: Cavity sealed off with DPC separation.	<input checked="" type="radio"/>	N	N/A	
Steel stud framing: Thermal break, 20mm self tapping tek screws.	<input checked="" type="radio"/>	N	N/A	

IMPORTANT: Please complete back page ... →

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-33

July 2009

# WCC Record of inspection Cladding brick veneer (B10)

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list <input type="checkbox"/> Y <input checked="" type="checkbox"/> N	

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

## List of non-compliances / comments

OK TO 1/2 HIGH.

Signed by: 

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

ENTERED

CSM-2009-1374

BCI-31

# WCC Record of inspection Building wrap & cavity (B8)



ANDREW COLLIER

Surveyor's Name	ANDREW COLLIER	Time in	9.25
Date	16 DEC 2009	Time out	9.50
ABA #	09-1374	Time total	25 min
Address	19 TITCH PLACE.		

Building wrap – record type: <u>TYVEK</u>		(wall)		(roof)	
No cladding in place	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Paper correctly restrained	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Wrap turned into openings & firmly secured	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Sealed at roof space	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Openings taped	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Wrap extends below bottom plate / joist	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Openings as per plan	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Support for downpipes, taps, etc	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Wrap fixed horizontally	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Penetrations sealed	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Lap no less than 75mm	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Roofing wrap laid to prevent ponding	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A		
No rips or tears	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A		

Cavity construction – record proposed cladding:		(wall)		(roof)	
Type of batten:	<input type="checkbox"/> Poly <input checked="" type="checkbox"/> Timber <input type="checkbox"/> CLD <input type="checkbox"/> Cavibat <input type="checkbox"/> PBS				
Batten treatment, size, fixings, centres	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Fixings appropriate for zone	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Poly battens 20mm min	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A	Vermis proofing installed	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A		
Slopes formed on all horizontal surfaces	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Steps in floor level adequately flashed	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A		
Batten / coloursteel separation layer _____ type	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A	CLD Battens – all cut edges sealed	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A		

Flashings – circle type: stainless steel / galvanised / <u>aluminium</u> / powder coated / plastic			
Fit for purpose	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Flashings to all internal, external corners	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A
Head, sill & jamb	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Flashings fitted all floor junctions	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A
Apron & stop ends	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A	Adjacent materials	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A
Saddle flashings to parapets and balconies	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A	Meter boxes & other penetrations flashed	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A
Saddle flashings and tape to C/L joists	<input checked="" type="radio"/> Y <input type="radio"/> N <input checked="" type="radio"/> N/A	Joins adequately lapped and sealed	<input checked="" type="radio"/> Y <input type="radio"/> N <input type="radio"/> N/A

Result of Inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

Producer statement check	Engineer's name:
Author on approved list	

⚡ IMPORTANT: Please complete back page ... ➔

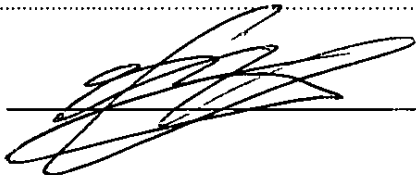
# WCC Record of inspection Building wrap & cavity (B8)

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

List of non-compliances / comments

OK TO CLAD.

Signed by: \_\_\_\_\_



ADD/NS  
# 441883

12/11/09

BCI-113

WCC Record of inspection  
Drainage (P3)

ENTERED

Waikare City Council  
Te Taiāroa o Waitāhanga

Surveyor's Name	Murray Adams	JOHN NICHOLLS	Time in	4:00
Date	26-11-09		Time out	4:30
ABA #	09-1374		Time total	30
Address	19 Titch Place.			

<b>Certificates</b>				
Registration checked	Y	N	N/A	Number:
Stormwater tanks	Y	N	N/A	

<b>Drainage</b>				<b>System: AS3500 / NZ</b>			
Stormwater on test	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Position of gullies	Y	N	<input type="radio"/>
Sewer on test	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Support & bedding of gullies	Y	N	<input type="radio"/>
Suitable gradient	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gully heights and accessibility	Y	N	<input type="radio"/>
AS3500 minimum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vent within 10m	Y	N	<input type="radio"/>
NZ 100mm diameter	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Manholes	Y	N	<input type="radio"/>
Cover to drains	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Invert levels correct	Y	N	<input type="radio"/>
Bedding of drains	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Dry chambers	Y	N	<input type="radio"/>
Connection to s/w lateral	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sloping sites - subsoil drainage	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connection to f/w lateral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Surface water - drives paths, etc	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connection to septic tank	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cess pits	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number & location of downpipes	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Run between downpipes	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>				

<b>Stormwater Tanks / Devices</b>										
Type of Device/s:	Retention tank	<input type="checkbox"/>	Detention tank	<input type="checkbox"/>	Rain garden	<input type="checkbox"/>	Swale/filter strip	<input type="checkbox"/>		
	Permeable paving	<input type="checkbox"/>	Dispersal device	<input type="checkbox"/>	Soakage pit / trench	<input type="checkbox"/>				
	Other (specify):									
If tank, is it - Buried <input type="checkbox"/> Above ground <input type="checkbox"/>										
Operation and maintenance manual received?				Y	N	N/A	Producer Statement (PS4) received?	Y	N	N/A

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list	Y N

IMPORTANT: Please complete back page ... →



# WCC Record of inspection Drainage (P3)



CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>PLUMBING &amp; DRAINAGE</b>					
As-Built Drainage <input checked="" type="checkbox"/> Pre-floor <input type="checkbox"/>	<input checked="" type="checkbox"/>		Backflow Preventer Test Certificate		
Plumbers Form			Installers Certificate for Backflow Preventer		
Drainlayers Form			Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation			EcoWater Conditions		
Installers Certificate for Waste-Water Installation			Licensed Cadastral Surveyors As-Built		
Quality Assurance Certificate			<b>ENGINEERS (PS4)</b>		
Solar Heating Certificate			Eng Cert for Stormwater Mitigation Devices		
Gas Certificate			Other:		
Other:			Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE <u>Final PT</u> INSPECTION.					

List of non-compliances / comments

S/W only

Sever done with Pre-floor inspection

Signed by:

ATTENTION INSPECTION SUPPORT: :	Is there a Stormwater Device, has EcoWater been emailed?	YES	NO
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Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed

Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-113

July 2009

COM-2009-1374

BCI-30

# WCC Record of inspection Framing (B7)

# ENTERED

Waitangi Whānau Centre  
Te Tūhono o Waitangi

Surveyor's Name	DAVID ELLERY	Time in	11.00
Date	10-12-2009	Time out	12.00
ABA #	2009-1374	Time total	1.0
Address	19 TUTUA PLACE GLA EDN		

Wind zone: low / medium / high / very high / specific Number of floors or levels inspected: (describe) TWO

General: If outcome is no (i.e. not approved), identify reasons in comment section below.			
Openings as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Treatment type + grading	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stud - size & c/s	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Stud heights	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Lintel size	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Lintel point loads	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Lintel fixings (wind)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bottom plate fixings - in general	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bottom plate - where face-fixed 6mm o/hang	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bottom plate fixings for bracing elements	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bottom plate DPC	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Bottom plate to stud 6Kn & 12Kn connection	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Top plate - size	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Uplift requirements - truss / stud / plate / lintels / beams	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Truss fixings as per M/F requirements	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Truss to top plate connections	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Purlin fixings / Tile battens	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ceiling plane bracing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Roof plane bracing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Flat strap bracing in pairs & taut	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Dragon ties	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Roof space braces	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Rafter size, c/s, fixing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Ridge beam size & fixing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Parapet framing & fixings (slopes 15°)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Flashing support (nogs)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Angle braces	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sheet braces	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Joist - size & c/s	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
C/L joist - treatment	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
C/L joist - flashings	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Deck level - step & fall across deck	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
External rafters and beams H3.2	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Fixing of ply bracing, decking, roof (S/S)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

Inter-tenancy: If outcome is no (i.e. not approved), identify reasons in comment section below.			
Single frame	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Double frame	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Floor / roof separation	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Subfloor separation	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

Result of Inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b> Author on approved list <input type="checkbox"/> Y <input type="checkbox"/> N	<b>Engineer's name:</b>
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⚡ IMPORTANT: Please complete back page ... ➔

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-30

July 2009

# WCC Record of inspection Framing (B7)

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

## List of non-compliances / comments

- 1) COMPLETE NOGS FOR APRON FLASHING SUPPORT
  - 2) FIT U/S X3 TO GARAGE DOOR LINTEL
  - 3) BRACE B25 CHANCE TO BRACELINE OK
  - 4) RELIEVED FRAME AND TRUSS CERTIFICATES
- OTHERWISE ALL OK TO LMAP

Signed by: \_\_\_\_\_

COM-2009-1374

TIMBER TREATMENT + GAUGE

COM 2009-1374

10-12-09

ENTERED

Auckland Frame & Truss Supplies Ltd  
53 McLaughlins Road  
Wiri, Manukau City  
P.O. Box 97 824  
South Auckland Mail Centre  
Ph. 250 0300  
Fax. 279 5780

November 30, 2009

Client: Goldsmith Developments Ltd.

## PRODUCER STATEMENT

Ref.

Type 5A  
Lot: 32 No. 8 Newfound Way  
Glen Eden

Job No. 98-1662  
Quote No. C & C

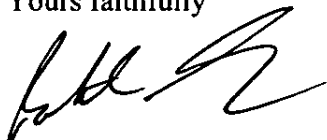
This statement is to confirm the frames supplied to the above job have been supplied as follows:

### **Timber frames:**

External Walls -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H1.2 Boron treated.
Ext. Bottom Plates -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H3 LOSP treated.
Internal Walls -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H1.2 Boron treated.
Int. Bottom Plates -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H3.1 LOSP treated.
"H" Walls -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H3.1 LOSP treated.
Top Trusses -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H1.2 Boron treated.
Lower Trusses -	Kiln Dried and Gauged Radiata Pine, Machine Stress Graded, H3.1 LOSP treated.

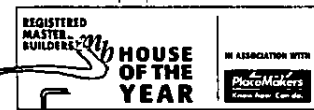
Note: All timber used in frames and trusses is a minimum grade MSG8 unless the architectural plan states MSG 10/12 and then the higher grade is used.

Yours faithfully



Robert Grimmer  
Branch Manager

PlaceMakers® Principal Sponsors of the:



Job: 02-1462

Client: PlaceMakers Takanini  
Phone:Site: Goldsmith Developments  
Lot 32  
Titch Place  
Glen EdenDescription:  
Building Consent No.:  
MiTek 20/20 Engineering 4.5.127

10m 2009-1314

MiTek New Zealand Ltd.

Phone: 021-750-280  
Printed 13:38:57 07 Nov 2009**PRODUCER STATEMENT for MiTek 20/20™ TRUSS DESIGN**

The MiTek 20/20™ truss design program has been developed by MiTek New Zealand Ltd for the design of GANG-NAIL® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20™ are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution to satisfy the requirements of Clause B1 of the Building Code.

This producer statement covers the MiTek 20/20™ truss design and the structural performance of the GANG-NAIL plate.

On behalf of MiTek New Zealand Ltd, and subject to:

- All proprietary products meeting their performance specification requirements
- The provision of adequate roof bracing and overall building stability
- Correct selection and placement of fixings
- Correct input of Truss Design Data below
- The design being undertaken by suitably trained personnel
- The truss design being carried out in accordance with MiTek 20/20 User Terms and Conditions,

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20™ truss design and shop drawings, will comply with the relevant provisions of the Building Code.

MiTek New Zealand Ltd holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Ltd,

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)

TECHNICAL SERVICES MANAGER, MiTek New Zealand Ltd

**MiTek 20/20™ TRUSS DESIGN DATA**

The MiTek 20/20™ computer design for this job is based on the following design parameters entered into the program. The GANG-NAIL Fabricator shall ensure that these job details are current and relevant to the project for the design of the trusses.

Job Details			Importance Level :	2	Design Working Life :	50 years
<b>Truss</b>						
Roof Group:	PMFT Truss_H1.2		Pitch:	28.000 deg	Std Overhang:	600 mm
<b>Roof</b>			<b>Ceiling</b>		<b>Wind</b>	
Material:	Galv Iron .5mm		Material:	Standard	Area:	High (44.0 m/s )
Dead Load:	0.210 kPa		Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres		Restraints:	400 mm centres		
Live Load:	Q <sub>ur</sub> = 0.250 kPa		Live Load:	Q <sub>c</sub> = 1.400 kN		
	Q <sub>c</sub> = 1.100 kN					

The timber for these trusses shall be standard gauged and treated to the requirements of NZS 3602:2003. Unless otherwise noted, this design assumes that the steel fixings and timber connectors proposed are located in a "closed environment", as defined by NZS3604:1999 Section 4.


**Truss List**

Legend: \* = detail only, ? = input only, ~~Txx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
ET2	1	5430	15.000	900	J3	1	880	15.000	900
ET3	1	2770	15.000	900	T1	3	6330	28.000	900
ET5	1D	6330	28.000	900	T2	1	6240	28.000	900
ET6	1D	6330	28.000	900	T3	4	6240	28.000	900
ET1	1	5430	15.000	900	T4	1	6240	28.000	900
ET4	1	880	15.000	900	T5	3	6330	28.000	900
J1	6	2430	15.000	900					
J2	1	2910	15.000	900					

Total quantity : 26

The computer design input has been carried out by:

Signed: 

Date: Saturday, 7 November 2009

Name of Computer Operator:

Daniel Harrison

Qualifications and Title: Detailer

Company:

PlaceMakers Frame & Truss





COM-2009-1374

ENTERED

BCI-24

# WCC Record of inspection Siting and foundations (B1)



Surveyor's Name	ANDREW COLLIER	Time in	10.12
Date	04 NOV 2009	Time out	10.49
ABA #	09-1374	Time total	37 min
Address	19 TITCH PLACE		

<b>Siting</b>			
Datum and FFL	<input checked="" type="radio"/> Y	<input type="radio"/> N	Datum taken from:
Siting as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	N/A (3 x pegs min)
Checked overland flow-path	<input type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A
Checked location / depth of drains	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A

Corrosion zone	S/S	<input checked="" type="radio"/> 1	Concrete strength	17.5MPa (Zone 1) (Footings)	<input checked="" type="radio"/> 20MPa (Zone 1) (Exposed)	25MPa (Seaspray) Concrete docket required	Other MPa
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<b>Strip foundations – all vegetation must be removed</b>									
Footprint as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Height pegs (must be clear of footings)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
Footing depth (450 min)	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Chairs / support	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
Footing width	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Cover	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	75mm bottom 50mm sides	
Bearing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Other steel - size	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
Starter size & c/s	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	All steel - tied	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
	< 500mm = D10			All steel - grade	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
	> 500mm = D12								
Starter laps	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A						
DPM for tanking	<input type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A						

<b>Pile foundations</b>									
Footprint as per plan	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Footing depth & width	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		
Timber treatment	<input type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A	DPM required	<input type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A		
Post size & c/s	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Bearing	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b> <input checked="" type="radio"/> Y	<b>Engineer's name:</b> MITCHEL JARVIS
Author on approved list <input checked="" type="radio"/> Y	WILTON JOUBERT.

IMPORTANT: Please complete back page ... →

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-24

July 2009

# WCC Record of inspection Siting and foundations (B1)

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate	✓		Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)	✓		Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry	✓		<b>OTHER</b>		
Engineers Certificate for Speciality Slab	✓		Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting	✓		Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT: <b>PRELIM.</b>					

## List of non-compliances / comments

OK TO POUR FIREWALL FOOTING & THREE PILLS  
TO SLAB PERIMETER.

Signed by: \_\_\_\_\_



COM-2009-1374

m.

BCI-28

WCC Record of inspection  
Speciality slab (B5)

ENTERED



ANDREW COLLIER

Surveyor's Name		Time in	11.38
Date	19 NOV 2009	Time out	12.02
ABA #	09-1374	Time total	29min
Address	19 TITCH PLACE.		

Siting					
Corrosion zone	Seaspray	Zone 1	Concrete strength	20MPa	25MPa Concrete docket required
Siting as per plan	<input checked="" type="checkbox"/>	N	N/A		Note if 25MPa or > Concrete docket required
Overland flow-path	<input checked="" type="checkbox"/>	N	N/A		
Datum vs. FFL	<input checked="" type="checkbox"/>	N	N/A	Datum taken from:	
Location / depth of drains	<input checked="" type="checkbox"/>	N	N/A		

Slab type				
Type	<input checked="" type="checkbox"/> Congra	<input type="checkbox"/> Firth	<input type="checkbox"/> Rib-raft	<input type="checkbox"/> Other (state)

Design check											
Site preparation / Metal under DPM	<input checked="" type="checkbox"/>	N	N/A	Cover to mesh	<input checked="" type="checkbox"/>	N	N/A	Slab thickness	<input checked="" type="checkbox"/>	N	N/A
Steel - grade / size / laps	<input checked="" type="checkbox"/>	N	N/A	Penetrations sealed	<input checked="" type="checkbox"/>	N	N/A	Rebate for B/V	<input checked="" type="checkbox"/>	N	N/A
Damp proof membrane	<input checked="" type="checkbox"/>	N	N/A	Rebates for doors	<input checked="" type="checkbox"/>	N	N/A	Bottom plate fixings	<input checked="" type="checkbox"/>	N	N/A
Point load pads	<input checked="" type="checkbox"/>	N	N/A	Isolated footing	<input checked="" type="checkbox"/>	N	N/A	Rib penetrations (Max. 50mm)	<input checked="" type="checkbox"/>	N	N/A
Slab thickenings	<input checked="" type="checkbox"/>	N	N/A	Rib widths	<input checked="" type="checkbox"/>	N	N/A	Poly - blocks fixed	<input checked="" type="checkbox"/>	N	N/A
Cover to steel (side / bottom)	<input checked="" type="checkbox"/>	N	N/A								
Slab dimensions	<input checked="" type="checkbox"/>	N	N/A								
F.F.L vs F.G.L	<input checked="" type="checkbox"/>	N	N/A								
Mesh size / laps	<input checked="" type="checkbox"/>	N	N/A								
Mesh in chairs	<input checked="" type="checkbox"/>	N	N/A								

Result of Inspection:	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b> WILTON JOUBERT
Author on approved list <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	

⚡ IMPORTANT: Please complete back page (... →

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-28

July 2009

BCI-28

# WCC Record of inspection Speciality slab (B5)



CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation of Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

List of non-compliances / comments

SLAB OK

Signed by: 

COM-2009-1374

BCI-25

ENTERED

# WCC Record of inspection Blockwork / Reinforced concrete (B2)



Surveyor's Name	ANDREW COLLIER	Time in	10.43
Date	10 NOV 2009	Time out	11.06
ABA #	09-1374	Time total	23 min.
Address	19 TITCH PLACE		

Concrete/grout strength	17.5MPa	20MPa	25MPa	Other
-------------------------	---------	-------	-------	-------

(Docket required for verification)

<b>Tilt Slab</b>			
Dimensions (incl thickness)	Y	N	N/A
Steel reinforcement size, spacing and grade	Y	N	N/A
All steel tied and secure	Y	N	N/A
Ensure no release agent on reinforcing	Y	N	N/A
Openings: Size and reinforcing	Y	N	N/A
Lifting eyes installed (as per eng design)	Y	N	N/A
Reinforcing concrete cover	Y	N	N/A
Steel Grade / Type			

<b>Sub-floor Blockwork</b>			
Vents	Y	N	N/A
Access	Y	N	N/A
Cross-flow	Y	N	N/A
Bearer support	Y	N	N/A
Crawl space	Y	N	N/A
Polythene required	Y	N	N/A
Contractor advised sub-floor inspection required	Y	N	N/A
Has provision for subsoil drainage been provided (sloping site)	Y	N	N/A

<b>Concrete Block Masonry (NZBC:B1 &amp; NZS 4210) Grade</b> A/B				If poured in series of lifts state lift number Lift # 1			
Correct block size	Y	N	N/A	Lintel steel size	Y	N	N/A
Starter size / centres	Y	N	N/A	Lintel stirrups	Y	N	N/A
Reinforcing steel cover (15mm min) / ties/ grade	Y	N	N/A	Draincoil with silt protection	Y	N	N/A
Starters lapped / tied	Y	N	N/A	Pilasters	Y	N	N/A
Bond beam steel	Y	N	N/A	Columns	Y	N	N/A
Rebate formed	Y	N	N/A	Beams	Y	N	N/A
Washouts provided at starter positions, foundation clean, (applicable where wall is greater than 1.2m high or has excessive mortar dropped on foundation)	Y	N	N/A	Retaining wall rear face pointed	Y	N	N/A
Control joints: max 6.0m ctrs, hori bar debonded eg denso taped or similar	Y	N	N/A	Cast in bolts/weld plates etc	Y	N	N/A
Mortar joints (min 7mm max 15mm)	Y	N	N/A	Openings reinforced with lintel, D16 in jamb and sill blocks	Y	N	N/A
Builder informed of vibration requirement	Y	N	N/A	Steel Grade / Type	AD 16's.		

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

IMPORTANT: Please complete back page ... →

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-25

July 2009

BCI-25

# WCC Record of inspection Blockwork / Reinforced concrete (B2)



Producer statement check	Engineer's name: MITCHEL VRANJES
Author on approved list	<input checked="" type="radio"/> Y <input type="radio"/> N

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>ENGINEERS (PS4)</b>			<b>CLADDING</b>		
Soil/Geotechnical Engineers Certificate			Applicators Certificate for Plaster Cladding		
Engineers Certificate for Foundations (Structural)			Manufacturers Warranty for Plaster Cladding		
Engineers Certificate for Pile Driving			Applicators Certificate for Installation ff Cladding		
Engineers Certificate for A/B Grade Masonry			<b>OTHER</b>		
Engineers Certificate for Speciality Slab			Electrical Certificate		
Engineers Certificate for Hardfill Compaction			Gas Certificate		
Engineers Certificate for Structural Framing			Glazing Certificate		
Engineers Certificate for Concrete Structure			Installers Certificate for Barrier Installation		
Manufacturers/Suppliers Certificate for Spread of Flame Index			Installers Certificate for Solid Fuel/Gas Heaters		
Manufacturers/Suppliers Cert. for Smoke Development Index			<b>WATERPROOFING</b>		
<b>SURVEYORS</b>			Applicators for Water Proofing to Wet Areas		
Surveyors Certificate for Siting			Applicators For Water Proofing To Decks		
Surveyors Certificate for Height in Relation to Boundary			Applicators for Water Proofing to Roof/Gutters		
Surveyors Certificate For Finished Floor Level (Linz Datum)			Applicators for Tanking to Retaining Wall		
<b>TIMBER</b>			Waterproofing Manufacturers Guarantee		
Manufacturers Certificate for Timber Treatment and Grading			Other:		
Manufacturers Certificate and Layout for Roof Trusses			Other:		
<b>CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT:</b>					

List of non-compliances / comments

OK TO FILL FIREWALL

Signed by:

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-25

July 2009

BCI-113

# WCC Record of inspection Drainage (P3)

NO COM-2009-1374  
**ENTERED**

Waitakere City Council  
Te Taitā o Waitākere

Surveyor's Name	Murray Norris	Time in	
Date	9-11-09	Time out	
ABA #	09-1374	Time total	
Address	19 Titch Place		

Certificates				
Registration checked	Y	N	N/A	Number:
Stormwater tanks	Y	N	N/A	

<b>Drainage</b>				<b>System: AS3500 / NZ</b>			
Stormwater on test	Y	N	N/A	Position of gullies	Y	N	N/A
Sewer on test	Y	N	N/A	Support & bedding of gullies	Y	N	N/A
Suitable gradient	Y	N	N/A	Gully heights and accessibility	Y	N	N/A
AS3500 minimum	Y	N	N/A	Vent within 10m	Y	N	N/A
NZ 100mm diameter	Y	N	N/A	Manholes	Y	N	N/A
Cover to drains	Y	N	N/A	Invert levels correct	Y	N	N/A
Bedding of drains	Y	N	N/A	Dry chambers	Y	N	N/A
Connection to s/w lateral	Y	N	N/A	Sloping sites - subsoil drainage	Y	N	N/A
Connection to f/w lateral	Y	N	N/A	Surface water - drives paths, etc	Y	N	N/A
Connection to septic tank	Y	N	N/A	Cess pits	Y	N	N/A
Number & location of downpipes	Y	N	N/A				
Run between downpipes	X	N	N/A				

<b>Stormwater Tanks / Devices</b>							
Type of Device/s:	Retention tank <input type="checkbox"/>	Detention tank <input type="checkbox"/>	Rain garden <input type="checkbox"/>	Swale/filter strip <input type="checkbox"/>			
	Permeable paving <input type="checkbox"/>	Dispersal device <input type="checkbox"/>	Soakage pit / trench <input type="checkbox"/>				
Other (specify):							
If tank, is it -	Buried <input type="checkbox"/>	Above ground <input type="checkbox"/>					
Operation and maintenance manual received?				Y	N	N/A	
				Producer Statement (PS4) received?			
				Y	N	N/A	

<b>Result of Inspection:</b>	
<b>Passed</b> <input type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>		<b>Engineer's name:</b>	
Author on approved list	Y	N	

**IMPORTANT: Please complete back page ... →**

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-113

July 2009

# WCC Record of inspection Drainage (P3)

CERTIFICATES		Required	Received	CERTIFICATES		Required	Received
<b>PLUMBING &amp; DRAINAGE</b>							
As-Built	Drainage <input type="checkbox"/> Pre-floor <input type="checkbox"/>			Backflow Preventer Test Certificate			
Plumbers Form				Installers Certificate for Backflow Preventer			
Drainlayers Form				Water Saving Inventory Device			
Engineers Cert. for Waste-Water Installation				EcoWater Conditions			
Installers Certificate for Waste-Water Installation				Licensed Cadastral Surveyors As-Built			
Quality Assurance Certificate				<b>ENGINEERS (PS4)</b>			
Solar Heating Certificate				Eng Cert for Stormwater Mitigation Devices			
Gas Certificate				Other:			
Other:				Other:			
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE				INSPECTION.			

List of non-compliances / comments

Please note this job was not booked in - Plumber did not want the inspection  
No charge Please

Signed by:   MN  

ATTENTION INSPECTION SUPPORT: :

Is there a Stormwater Device, has EcoWater been emailed?

YES

NO

NO CONT-2009-1374  
ENTERED

BCI-113

## WCC Record of inspection Drainage (P3)

Waitakere City Council  
Te Tāhā o Waitākere

Surveyor's Name	Murray Norris	Time in	
Date	5-11-09	Time out	
ABA #	09-1374	Time total	
Address	19 Titch Place.		

Certificates				
Registration checked	Y	N	N/A	Number:
Stormwater tanks	Y	N	N/A	

Drainage				System: AS3500 / NZ			
Stormwater on test	Y	N	N/A	Position of gullies	Y	N	N/A
Sewer on test	Y	N	N/A	Support & bedding of gullies	Y	N	N/A
Suitable gradient	Y	N	N/A	Gully heights and accessibility	Y	N	N/A
AS3500 minimum	Y	N	N/A	Vent within 10m	Y	N	N/A
NZ 100mm diameter	Y	N	N/A	Manholes	Y	N	N/A
Cover to drains	Y	N	N/A	Invert levels correct	Y	N	N/A
Bedding of drains	Y	N	N/A	Dry chambers	Y	N	N/A
Connection to s/w lateral	Y	N	N/A	Sloping sites - subsoil drainage	Y	N	N/A
Connection to f/w lateral	Y	N	N/A	Surface water - drives paths, etc	Y	N	N/A
Connection to septic tank	Y	N	N/A	Cess pits	Y	N	N/A
Number & location of downpipes	Y	N	N/A				
Run between downpipes	Y	N	N/A				

Stormwater Tanks / Devices							
Type of Device/s:	Retention tank <input type="checkbox"/>	Detention tank <input type="checkbox"/>	Rain garden <input type="checkbox"/>	Swale/filter strip <input type="checkbox"/>			
	Permeable paving <input type="checkbox"/>	Dispersal device <input type="checkbox"/>	Soakage pit / trench <input type="checkbox"/>				
	Other (specify):						
If tank, is it -	Buried <input type="checkbox"/>	Above ground <input type="checkbox"/>					
Operation and maintenance manual received?	Y	N	N/A	Producer Statement (PS4) received?	Y	N	N/A

Result of Inspection:	
<b>Passed</b> <input type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/> Field Note <input type="checkbox"/> Failed Letter <input type="checkbox"/> Amendments Required <input type="checkbox"/> Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b> Author on approved list <span style="float: right;">Y N</span>	<b>Engineer's name:</b>
---	-------------------------

🔑 **IMPORTANT: Please complete back page ... ➔**

# WCC Record of inspection Drainage (P3)

CERTIFICATES		Required	Received	CERTIFICATES		Required	Received
<b>PLUMBING &amp; DRAINAGE</b>							
As-Built	Drainage <input type="checkbox"/> Pre-floor <input type="checkbox"/>			Backflow Preventer Test Certificate			
Plumbers Form				Installers Certificate for Backflow Preventer			
Drainlayers Form				Water Saving Inventory Device			
Engineers Cert. for Waste-Water Installation				EcoWater Conditions			
Installers Certificate for Waste-Water Installation				Licensed Cadastral Surveyors As-Built			
Quality Assurance Certificate				<b>ENGINEERS (PS4)</b>			
Solar Heating Certificate				Eng Cert for Stormwater Mitigation Devices			
Gas Certificate				Other:			
Other:				Other:			
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE				INSPECTION.			

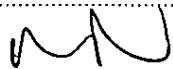
List of non-compliances / comments

This was book incorrectly

~~the~~ Consent # was 2009-1136 for  
another ~~to~~ location

NO charge please !!

Signed by: \_\_\_\_\_



ATTENTION INSPECTION SUPPORT: :

Is there a Stormwater Device, has EcoWater been emailed?

YES

NO

BCI-111

ENTERED

# WCC Record of inspection Prefloor plumbing (P1)

 Waitakere City Council  
Te Taitahi o Waitakere

Surveyor's Name	JOHN NICHOLLS	Time in	
Date	12.11.09	Time out	
ABA #	09/1374	Time total	
Address	19 Titch.		

Drains on test	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Materials	Copper <input checked="" type="checkbox"/> PVC <input type="checkbox"/> Polybutylene
Plumber registration #	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A 14475	System	AS3500 <input checked="" type="checkbox"/> NZ

Pre-floor plumbing			
Check floor plan vs. fixture layout	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Floor waste gully	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A
Pipes sleeved or taped	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	HWC discharge pipe	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A
Pipe size	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Eco water requirements	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
Pipe gradient	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Water saving inventory	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
25mm separation pipe - foundations	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Step in floor - provision for drainage	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
50mm concrete cover to pipes to u/s of slab	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A	Sloping site - provision for drainage	<input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A
No pipes penetrating slab thickenings or point load pads	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A		<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A

<b>Result of inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list <input type="checkbox"/> Y <input type="checkbox"/> N	

CERTIFICATES	Required	Received	CERTIFICATES	Required	Received
<b>PLUMBING &amp; DRAINAGE</b>					
As-Built Drainage <input type="checkbox"/> Pre-floor <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Backflow Preventer Test Certificate		
Plumbers Form		<input checked="" type="checkbox"/>	Installers Certificate for Backflow Preventer		
Drainlayers Form			Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation			EcoWater Conditions		
Installers Certificate for Waste-Water Installation			Licensed Cadastral Surveyors As-Built		
Quality Assurance Certificate			<b>ENGINEERS (PS4)</b>		
Solar Heating Certificate			Eng Cert for Stormwater Mitigation Devices		
Gas Certificate			Other:		
Other:			Other:		

CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE INSPECTION.

List of non-compliances / comments

 Signed by: 

 Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
 Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-111

July 2009

# ENTERED

Com-2009-1374

BCI-113

## WCC Record of inspection Drainage (P3)



Surveyor's Name	JOHN NICHOLLS		Time in	8.30
Date	12.11.09		Time out	9.00
ABA #	09/1374		Time total	30
Address	19 Iitch			

<b>Certificates</b>				
Registration checked	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Number: 14475
Stormwater tanks	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A	

<b>Drainage</b>				<b>System: AS3500 / NZ</b>			
Stormwater on test	<input checked="" type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	Position of gullies	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Sewer on test	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Support & bedding of gullies	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Suitable gradient	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Gully heights and accessibility	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
AS3500 minimum	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Vent within 10m	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
NZ 100mm diameter	<input checked="" type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A	Manholes	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A
Cover to drains	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Invert levels correct	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A
Bedding of drains	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Dry chambers	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A
Connection to s/w lateral	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Sloping sites - subsoil drainage	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A
Connection to f/w lateral	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Surface water - drives paths, etc	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Connection to septic tank	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input checked="" type="radio"/> N/A	Cess pits	<input checked="" type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A
Number & location of downpipes	<input checked="" type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A				
Run between downpipes	<input checked="" type="radio"/> Y	<input checked="" type="radio"/> N	<input type="radio"/> N/A				

<b>Stormwater Tanks / Devices</b>								
Type of Device/s:	Retention tank	<input type="checkbox"/>	Detention tank	<input type="checkbox"/>	Rain garden	<input type="checkbox"/>	Swale/filter strip	<input type="checkbox"/>
	Permeable paving	<input type="checkbox"/>	Dispersal device	<input type="checkbox"/>	Soakage pit / trench	<input type="checkbox"/>		
	Other (specify):							
If tank, is it -		Buried	<input type="checkbox"/>	Above ground	<input type="checkbox"/>			
Operation and maintenance manual received?				<input type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A	Producer Statement (PS4) received?	
				<input type="radio"/> Y	<input type="radio"/> N	<input type="radio"/> N/A		

<b>Result of Inspection:</b>	
<b>Passed</b> <input checked="" type="checkbox"/> Subject to production as stipulated of the documents indicated overleaf (if any)	<b>Failed</b> <input type="checkbox"/>
Notice to Fix Resolved <input type="checkbox"/>	Issue Notice to Fix <input type="checkbox"/>
Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>	Field Note <input type="checkbox"/>
	Failed Letter <input type="checkbox"/>
	Amendments Required <input type="checkbox"/>
	Additional Inspections Required: Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Producer statement check</b>	<b>Engineer's name:</b>
Author on approved list	
<input type="radio"/> Y <input type="radio"/> N	

Refloor as well

**IMPORTANT: Please complete back page ... →**

Instructions: If outcome is no (i.e. not approved), identify reasons in non-compliance / comment section. All sections must be completed  
Key: Yes = approved: No = not approved: N/A = not applicable:

BCI-113

July 2009

# WCC Record of inspection Drainage (P3)

CERTIFICATES		Required	Received	CERTIFICATES		Required	Received
<b>PLUMBING &amp; DRAINAGE</b>							
As-Built	Drainage <input checked="" type="checkbox"/>		Pre-floor <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Backflow Preventer Test Certificate		
Plumbers Form					Installers Certificate for Backflow Preventer		
Drainlayers Form				<input checked="" type="checkbox"/>	Water Saving Inventory Device		
Engineers Cert. for Waste-Water Installation					EcoWater Conditions		
Installers Certificate for Waste-Water Installation					Licensed Cadastral Surveyors As-Built		
Quality Assurance Certificate					<b>ENGINEERS (PS4)</b>		
Solar Heating Certificate					Eng Cert for Stormwater Mitigation Devices		
Gas Certificate					Other:		
Other:					Other:		
CERTIFICATES (AS TICKED ABOVE) ARE REQUIRED AT THE <u>Fidical PFI</u> INSPECTION.							

List of non-compliances / comments

*Only s/s*

*Stormwater to come*

Signed by: 

ATTENTION INSPECTION SUPPORT: :	Is there a Stormwater Device, has EcoWater been emailed?	YES	<b>NO</b>
---------------------------------	--	-----	-----------



Waitakere City Council  
Te Taiao o Waitakere

# Drainlayer

Com-2009-1374  
JOHN NICHOLLS

Building Consent No: COM-2008-1464

## NOTIFICATION OF LICENSED TRADESMAN – DRAINLAYER

To be completed and returned to Council 48 hours prior to any work commencing

OWNER: NEW ZEALAND HOUSING FOUNDATION

MAILING ADDRESS:  
C/- Housing Foundation  
PO Box 36027  
Northcote  
NORTH SHORE CITY 0748

PROJECT LOCATION  
ADDRESS:  
19 Titch Place, Glen Eden

LEGAL DESCRIPTION  
VALUATION ROLL NO:  
LOT & DP: LOT 32 DP 389289

DRAINLAYER

DATE: 2-11-09

LICENSED DRAINLAYER NAME: Bryan Chapman

ADDRESS: 30 London St Te Atatu

PHONE: 0275 347 500

LICENSE NUMBER: 14475

TRADESMAN'S SIGNATURE: [Signature]

Has been appointed to carry out the work described in the above referred building consent.  
DESCRIPTION OF WORK: drainage to new house

Copy of tradesman's current licence (tick)

☐ Attached

☒ Onfile

Inspection Required: All Drainage :Before being backfilled

The Plumbers, Gasfitters and Drainlayers Board has pointed out that there appears to be some confusion about the effect of the Building Act on who can legally do sanitary plumbing, gasfitting and drainlaying. In fact, the Building Act made only a minor amendment to the Plumbers, Gasfitters and Drainlayers Act 1976 and has not altered the situation that, under the Act, subject to certain specific expectations:  
Sanitary plumbing and gasfitting must still be done by a craftsman plumber or gasfitter, as appropriate, or by a registered plumber or gasfitter under their directions; and drainlaying must still be done by a registered drainlayer.  
In this respect, it should be noted that the Form 3 in the Second Schedule of the Regulations mentions registered plumbers and gasfitters. The fact that it does not mention craftsman plumbers and craftsmen gasfitters does not affect the requirements of the Plumbers, Gasfitters and Drainlayers Act 1976 as outlined above.

**NOTIFICATION OF LICENSED TRADESMAN – PLUMBER**  
To be completed and returned to Council 48 hours prior to any work commencing

**OWNER: NEW ZEALAND HOUSING FOUNDATION**

**MAILING ADDRESS:**  
C/- Housing Foundation  
PO Box 36027  
Northcote  
NORTH SHORE CITY 0748

**PROJECT LOCATION**  
**ADDRESS:**  
19 Titch Place, Glen Eden

**LEGAL DESCRIPTION**  
**VALUATION ROLL NO:**  
**LOT & DP:** LOT 32 DP 389289

**PLUMBER**

**DATE:** 2-11-09

**LICENSED PLUMBER NAME:** Bryan Chapman

**ADDRESS:** 30 London VOT Te Atatu

**PHONE:** 0275 347 500

**LICENSE NUMBER:** 14475

**TRADESMAN'S SIGNATURE:** 

Has been appointed to carry out the work described in the above referred building consent.

**DESCRIPTION OF WORK:** Plumbing to new house

Copy of tradesman's current licence (tick)

☐ Attached

☒ Onfile

**Inspection Required:**

All Drainage

:Before being backfilled

The Plumbers, Gasfitters and Drainlayers Board has pointed out that there appears to be some confusion about the effect of the Building Act on who can legally do sanitary plumbing, gasfitting and drainlaying. In fact, the Building Act made only a minor amendment to the Plumbers, Gasfitters and Drainlayers Act 1976 and has not altered the situation that, under the Act, subject to certain specific expectations:

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**Jason Lim**

---

**From:** Kevin Wilkie  
**Sent:** Thursday, 10 December 2009 9:41 a.m.  
**To:** Ragu Ragunathan  
**Cc:** Jason Lim; Jayesh Solanki; Quentin Dagger  
**Subject:** RE: 69 Margan Avenue - Amendment required on sewer line

**Hi Ragu**

**In response to your email I wish to clarify that in regard to the investigation of the manhole and the old drainage line discovered on site we advised your client in our letter of 5 November that whilst Council was prepared to investigate the situation if they wished to expedite the process that they should proceed to locate the manhole and the drain themselves.**

**Our investigation has identified that the drainage line is serving additional properties to the South and as such is a public line. We have not as yet determined the full extent of the catchment being served as the line has restrictions, outside of your client's property, that are preventing a full CCTV inspection. We are arranging for these restrictions to be cleared so we complete our investigation.**

**Given the situation that your client is in we are agreeable in this case to have your clients drainlayer undertake these additional works within their property under the supervision of Council's contractor. The Council contractor's input is required to ensure that servicing is maintained whilst the works are being undertaken.**

**The layout for the diversion that you proposed is acceptable and Jason is processing the approval for the works based on the information that you have supplied. Please note that this process is not our normal procedure and is a concession that we have made to assist your client and is not to be taken as a precedent.**

**As already advised by Jason the old drainage line under your proposed minor unit will need to be replaced as it is an earthenware line.**

**You will also need to apply for a amendment to the Building Consent for the minor unit as the foundations will need to be changed to comply with our usual building over requirements.**

**Kind Regards**

**Kevin Wilkie  
Principal Subdivision & Consents Engineer  
Development Services - EcoWater**

**Waitakere City Council  
Waitakere Central - Admin Building Level 4  
6 Henderson Valley Road  
Phone: 836 8000 Ext 9417  
Fax: 836 8001  
Email: [kevin.wilkie@waitakere.govt.nz](mailto:kevin.wilkie@waitakere.govt.nz)**

---

**From:** Emacs Group [<mailto:emacs@emacs ltd.co.nz>] On Behalf Of Ragu Ragunathan  
**Sent:** Tuesday, 8 December 2009 3:35 p.m.  
**To:** Jason Lim; Kevin Wilkie  
**Cc:** [dinesh.mani@xtra.co.nz](mailto:dinesh.mani@xtra.co.nz); Kent Liu

16/12/2009

**Subject: 69 Margan Avenue - Amendment required on sewer line**

**Dear Jason and Kevin,**

**This issue has not been resolved yet and construction works are on-hold due to this issue.**

**Background:**

**A manhole was suddenly discovered by the Builder when the existing building was removed. Exposed manhole was buried under the floor slab of existing building. Then Jason issued stop-work notice until this issue is resolved.**

**When the issue was raised by Ecowater, initially it was not known whether it is a public line or private line. The suspicion was that it could be a public line as it is connected to a manhole, which appeared to be built for this connection purpose. Hence Ecowater has agreed to do investigation and advice us of outcome.**

**It has been more than three weeks that Ecowater is still unable to advice of outcome. This is really disappointing progress. It is costing the owner to put hold on this project for this long. Everyday is costing him. He is very frustrated and worried about the loss incurred due to inaccuracy of Council records.**

**Could you please look into this matter urgently. Attached plan shows the proposed alteration. Please review and approve.**

**As it has been very slow from Council side, can you please allow owner to engage a contractor to fix this issue. As engineers, we and Ecowater Engineers will supervise. Or please advice your contractor to speed up this process.**

**Kind Regards**

**Ragu Ragunathan  
Principal  
EMACS Group Limited  
PO Box 67-026, Mt Eden, Auckland**

**P: 09 630 7125 Ext: 204  
F: 09 631 7126  
E: [emacs@emacsltd.co.nz](mailto:emacs@emacsltd.co.nz)**

**Jason Lim**

---

**From:** Emacs Group [emacs@emacsltd.co.nz] on behalf of Ragu Ragunathan [ragu@emacsltd.co.nz]  
**Sent:** Tuesday, 8 December 2009 3:35 p.m.  
**To:** Jason Lim; Kevin Wilkie  
**Cc:** dinesh.mani@xtra.co.nz; Kent Liu  
**Subject:** 69 Margan Avenue - Amendment required on sewer line  
**Attachments:** 2009-12-08\_Amended drainage plan.pdf; 2009-12-08\_Eng application.pdf

**Dear Jason and Kevin,**  
**This issue has not been resolved yet and construction works are on-hold due to this issue.**

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**Kind Regards**

**Ragu Ragunathan  
Principal  
EMACS Group Limited  
PO Box 67-026, Mt Eden, Auckland**

**P: 09 630 7125 Ext: 204  
F: 09 631 7126  
E: emacs@emacsltd.co.nz**

9/12/2009

**Jason Lim**


---

**From:** Emacs Group [mgmt@emacsltd.co.nz]  
**Sent:** Friday, 13 November 2009 7:18 p.m.  
**To:** Jason Lim  
**Cc:** emenuwal; dinesh.mani@xtra.co.nz  
**Subject:** RE: 69 Margan Ave

Hello Jason,

Your letter appear to be extreme warning letter and putting all construction works on hold. This raises high concern on delay and costs to the owner. As you are aware, any stop work on any construction generally leads to high costs. In this case, there is no doubt this delay will affect the owner financially.

1. It is obvious that this manhole was not shown on the Council record. Therefore no-one knew about this manhole.
2. This manhole lid was connected to existing concrete. When the concrete was removed the lid and frame was damaged.

Therefore it is not possible at all to blame contractor on this case.

Looking at solution.....

It is costly to make an amendment to building consent unless Council is willing to compensate. The costs for amendment involves amendment preparation, structural engineering costs, delays and Council fees.

Therefore it is advisable to find a solution without amending the building consent, which is.....

- if the in coming pipe is dead line, then manhole can be closed off. The issue is very straight forward.
- if the incoming line is live, then this line may be considered as private line. It is highly unlikely to have many houses connected to it unless Council record is entirely wrong in this area. If this is the case, then this line can be diverted around the building. The costs involved in this case would be diversion costs and closing off manhole.

Therefore we must find a solution to avoid going for an amendment.

In terms of Council investigation, I think Council assets team must give high priority and carry out investigation. This can be done within a day or two considering the urgency. If it is going to take more than two days, then Council must look at compensating the owner for the delays.

Therefore I would like to urge you to talk to Council asset team to do investigation urgently. Once this investigation is done, please let us know. I am quite happy to meet and resolve this issue urgently rather than delaying construction progress.

In the mean time, I hope Contractor can continue with construction of minor unit as it is outside of this manhole. Please advice if your view is different form this.

Kind Regards

**Ragu Ragunathan**  
Principal

**EMACS Group Ltd**  
**Infrastructure, Building and Land development Consultants**  
(Professional Consulting Engineers, Planners and Surveyors)

Level 2A, 40 Mt Eden Road, Mt Eden, Auckland  
PO Box 67-026, Mt Eden, Auckland  
P: 09 6307125 Ext 204 | F: 09 6307126 | M: 0272 990 020  
E: emacs@emacsltd.co.nz | W: www.emacsltd.co.nz

---

**From:** emenuwal [mailto:emenuwal@habitatbuilders.co.nz]

16/12/2009

**Sent:** 13 November 2009 11:14 a.m.  
**To:** dinesh.mani@xtra.co.nz; Emacs Group  
**Subject:** FW: 69 Margan Ave

Hi dinesh, got this from the council.  
I think the best way to resolve this is to shift the main dwelling to front of the property.  
I have spoken to Raghu about this and he will discuss this with you.  
emenuwal

---

**From:** Jason Lim [mailto:Jason.Lim@waitakere.govt.nz]  
**Sent:** Friday, 13 November 2009 10:27 a.m.  
**To:** emenuwal@habitatbuilders.co.nz  
**Subject:** 69 Margan Ave

Hi,

Attached herewith the letter dated 5/11/09 as requested.

**Jason Lim**  
Subdivisions & Consents Engineer  
Development Services

Please consider the environment before printing this e-mail

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**Thank You.**

**<http://www.waitakere.govt.nz>**

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No virus found in this incoming message.  
Checked by AVG - [www.avg.com](http://www.avg.com)  
Version: 9.0.707 / Virus Database: 270.14.61/2497 - Release Date: 11/13/09 03:33:00

16/12/2009

**Jason Lim**

---

**From:** Ragu Ragunathan [ragu@emacsltd.co.nz]  
**Sent:** Friday, 11 December 2009 8:56 a.m.  
**To:** Quentin Dagger  
**Cc:** Kevin Wilkie; Jason Lim; Jayesh Solanki; Kent Liu  
**Subject:** RE: 69 Margan Avenue - Amendment required on sewer line

Hello Quentin,  
I hope you can understand the situation here.  
Short brief:

A public unrecorded sewer line was discovered during removal of existing building. Then it was found that this line is running through the area of proposed minor household unit. All site works are on-hold due to this issue. We need to apply for foundation amendment to bridge this line. We will apply for amendment shortly. We would appreciate if you could please assist on this to fast track this approval (amendment).

Thank you  
Ragu

-----Original Message-----

**From:** Kevin Wilkie [mailto:Kevin.Wilkie@waitakere.govt.nz]  
**Sent:** Thu 12/10/2009 3:50 PM  
**To:** Ragu Ragunathan  
**Cc:** Jason Lim; Jayesh Solanki; Quentin Dagger  
**Subject:** RE: 69 Margan Avenue - Amendment required on sewer line

Noted but please be aware you have no approval to commence wthe works until we have issued the approval for this.

Kind Regards

Kevin Wilkie  
Principal Subdivision & Consents Engineer  
Development Services - EcoWater

Waitakere City Council  
Waitakere Central - Admin Building Level 4  
6 Henderson Valley Road  
Phone: 836 8000 Ext 9417  
Fax: 836 8001  
Email: kevin.wilkie@waitakere.govt.nz

---

**From:** Ragu Ragunathan [mailto:ragu@emacsltd.co.nz]  
**Sent:** Thursday, 10 December 2009 1:23 p.m.  
**To:** Kevin Wilkie  
**Cc:** Jason Lim; Jayesh Solanki; Quentin Dagger  
**Subject:** RE: 69 Margan Avenue - Amendment required on sewer line

Thanks Kevin.  
I will advice our client (property owner). As I mentioned he is very upset on two counts. 1. Delay caused by this issue. 2. Additional cost. I will leave it to him to attend his concerns in an appropriate ways.

In terms of progressing with the work involved, we will action upon direction from our client. We will talk a Drainlayer and organise this.

16/12/2009

Kind Regards  
Ragu

-----Original Message-----

From: Kevin Wilkie [mailto:Kevin.Wilkie@waitakere.govt.nz]  
Sent: Thu 12/10/2009 9:40 AM  
To: Ragu Ragunathan  
Cc: Jason Lim; Jayesh Solanki; Quentin Dagger  
Subject: RE: 69 Margan Avenue - Amendment required on sewer line

Hi Ragu

In response to your email I wish to clarify that in regard to the investigation of the manhole and the old drainage line discovered on site we advised your client in our letter of 5 November that whilst Council was prepared to investigate the situation if they wished to expedite the process that they should proceed to locate the manhole and the drain themselves.

Our investigation has identified that the drainage line is serving additional properties to the South and as such is a public line. We have not as yet determined the full extent of the catchment being served as the line has restrictions, outside of your client's property, that are preventing a full CCTV inspection. We are arranging for these restrictions to be cleared so we complete our investigation.

Given the situation that your client is in we are agreeable in this case to have your client's drainlayer undertake these additional works within their property under the supervision of Council's contractor. The Council contractor's input is required to ensure that servicing is maintained whilst the works are being undertaken.

The layout for the diversion that you proposed is acceptable and Jason is processing the approval for the works based on the information that you have supplied. Please note that this process is not our normal procedure and is a concession that we have made to assist your client and is not to be taken as a precedent.

As already advised by Jason the old drainage line under your proposed minor unit will need to be replaced as it is an earthenware line.

You will also need to apply for an amendment to the Building Consent for the minor unit as the foundations will need to be changed to comply with our usual building over requirements.

Kind Regards

Kevin Wilkie  
Principal Subdivision & Consents Engineer  
Development Services - EcoWater

Waitakere City Council  
Waitakere Central - Admin Building Level 4  
6 Henderson Valley Road  
Phone: 836 8000 Ext 9417  
Fax: 836 8001  
Email: kevin.wilkie@waitakere.govt.nz

---

From: Emacs Group [mailto:emacs@emacsld.co.nz] On Behalf Of Ragu Ragunathan

16/12/2009

Sent: Tuesday, 8 December 2009 3:35 p.m.  
To: Jason Lim; Kevin Wilkie  
Cc: dinesh.mani@xtra.co.nz; Kent Liu  
Subject: 69 Margan Avenue - Amendment required on sewer line

Dear Jason and Kevin,  
This issue has not been resolved yet and construction works are on-hold due to this issue.

**Background:**

A manhole was suddenly discovered by the Builder when the existing building was removed. Exposed manhole was buried under the floor slab of existing building. Then Jason issued stop-work notice until this issue is resolved.

When the issue was raised by Ecowater, initially it was not known whether it is a public line or private line. The suspicion was that it could be a public line as it is connected to a manhole, which appeared to be built for this connection purpose.  
Hence Ecowater has agreed to do investigation and advice us of outcome.

It has been more than three weeks that Ecowater is still unable to advice of outcome. This is really disappointing progress. It is costing the owner to put hold on this project for this long. Everyday is costing him. He is very frustrated and worried about the loss incurred due to inaccuracy of Council records.

Could you please look into this matter urgently. Attached plan shows the proposed alteration. Please review and approve.

As it has been very slow from Council side, can you please allow owner to engage a contractor to fix this issue. As engineers, we and Ecowater Engineers will supervise.  
Or please advice your contractor to speed up this process.

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Ragu Ragunathan  
Principal  
EMACS Group Limited  
PO Box 67-026, Mt Eden, Auckland

P: 09 630 7125 Ext: 204  
F: 09 631 7126  
E: [emacs@emacsltd.co.nz](mailto:emacs@emacsltd.co.nz)

Please consider the environment before printing this e-mail

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Any views expressed in this message are those of the individual sender, except where the message states otherwise and the sender is authorised to state them to be the views of any such entity.

16/12/2009

Thank You.

<http://www.waitakere.govt.nz>

**Jason Lim**

---

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**Attachments:** Maize Bkgrd.jpg

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16/12/2009

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Kevin Wilkie  
Principal Subdivision & Consents Engineer  
Development Services - EcoWater

Waitakere City Council  
Waitakere Central - Admin Building Level 4  
6 Henderson Valley Road  
Phone: 836 8000 Ext 9417  
Fax: 836 8001  
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Background:

A manhole was suddenly discovered by the Builder when the existing building was removed. Exposed manhole was buried under the floor slab of existing building. Then Jason issued stop-work notice until this issue is resolved.

When the issue was raised by Ecowater, initially it was not known whether it is a public line or private line. The suspicion was that it could be a public line as it is connected to a manhole, which appeared to be built for this connection purpose.

Hence Ecowater has agreed to do investigation and advice us of outcome.

It has been more than three weeks that Ecowater is still unable to advice of outcome. This is really disappointing progress. It is costing the owner to put hold on this project for this long. Everyday is costing him. He is very frustrated and worried about the loss incurred due to inaccuracy of Council records.

Could you please look into this matter urgently. Attached plan shows the proposed alteration. Please review and approve.

As it has been very slow from Council side, can you please allow owner to engage a contractor to fix this issue. As engineers, we and Ecowater Engineers will supervise.

Or please advice your contractor to speed up this process.

Kind Regards

Ragu Ragunathan  
Principal  
EMACS Group Limited  
PO Box 67-026, Mt Eden, Auckland

P: 09 630 7125 Ext: 204

16/12/2009

F: 09 631 7126

E: [emacs@emacsltd.co.nz](mailto:emacs@emacsltd.co.nz)

Please consider the environment before printing this e-mail

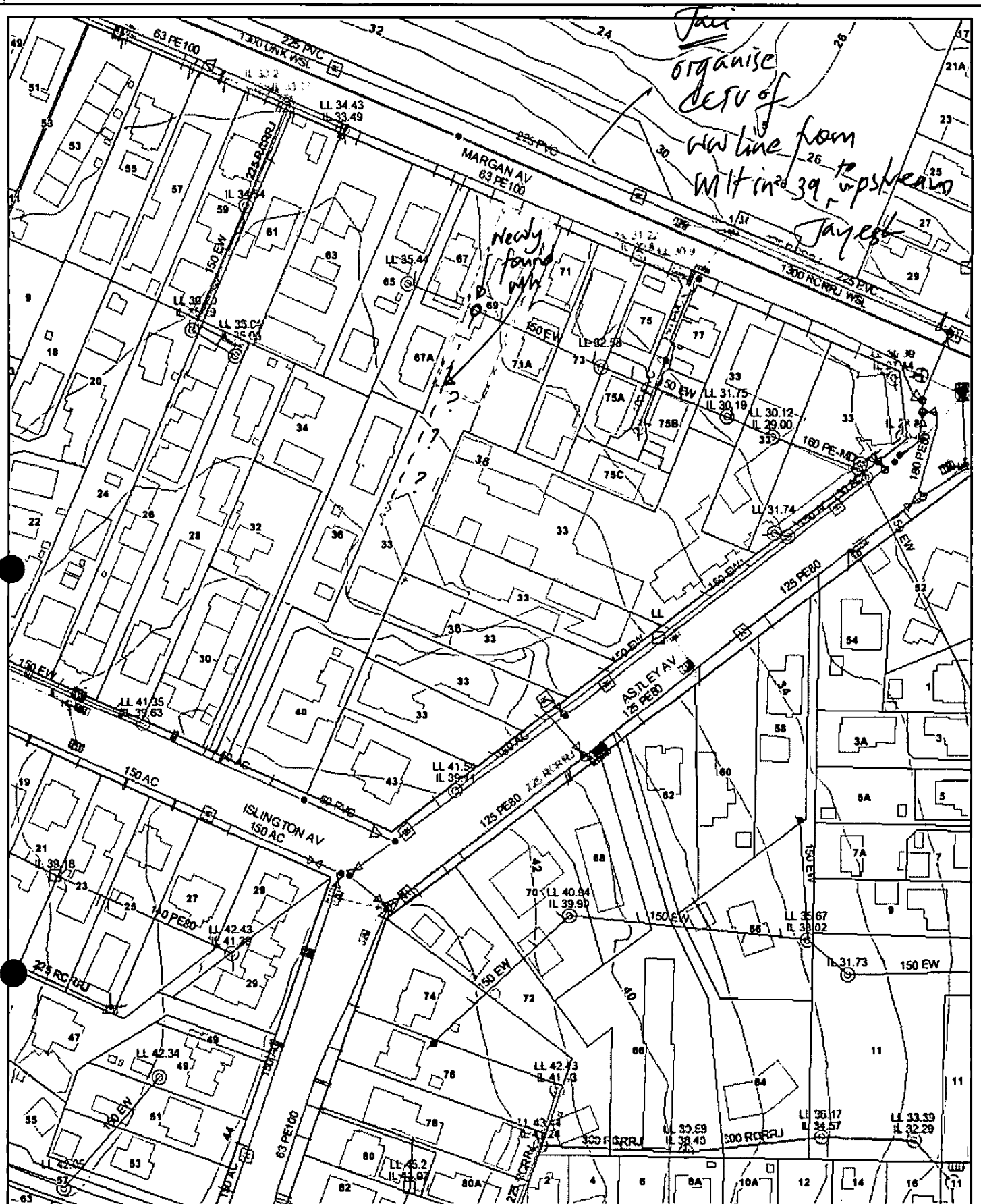
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Thank You.

<http://www.waitakere.govt.nz>



5/11/2009

Cadastral information from  
Land Information New Zealand  
Digital Cadastral Database DCDB  
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Scale = 1:1,492 @ A4

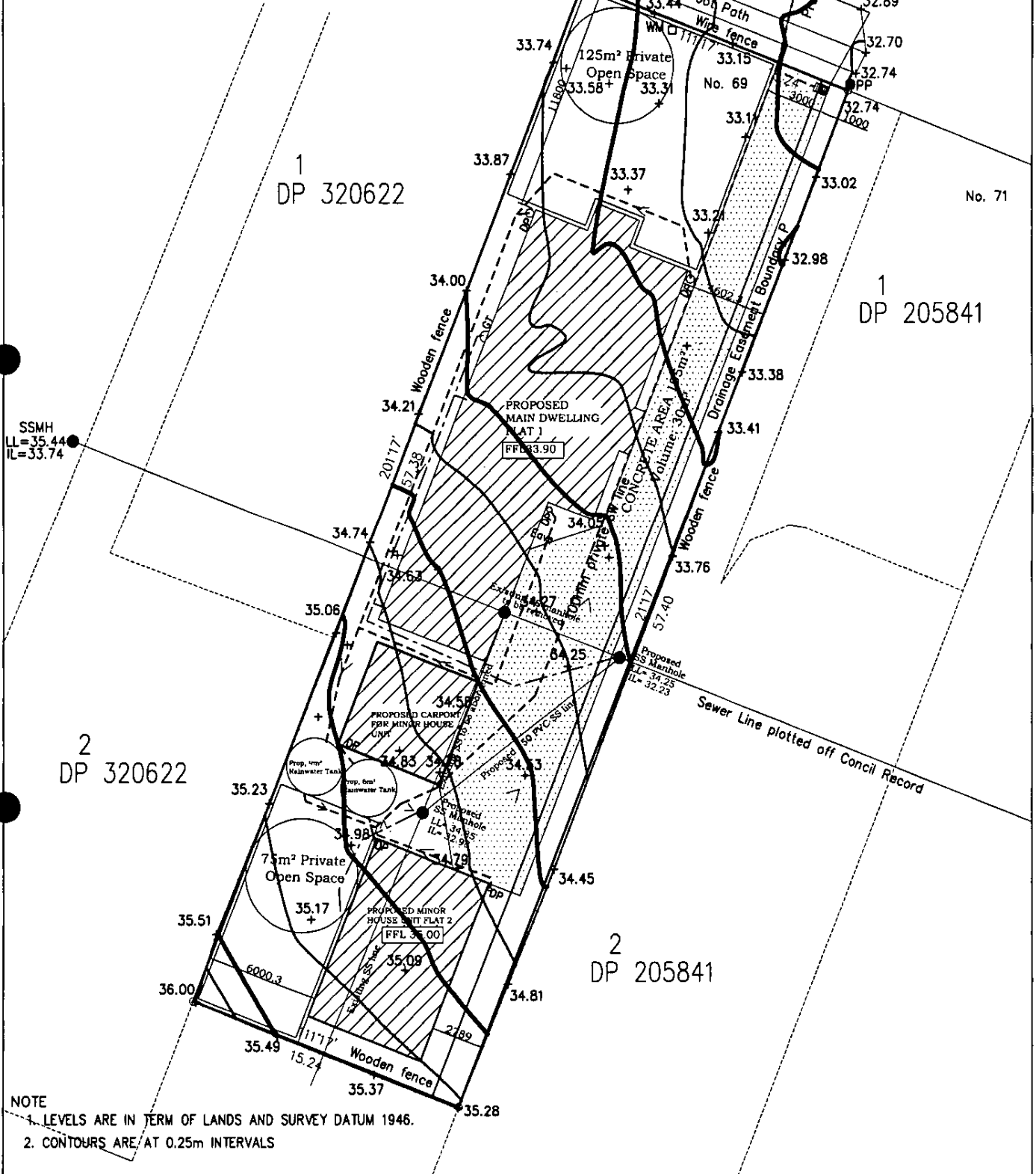
Services shown on public amenity land are not public drains unless used as through drains. While Council endeavours to provide accurate spatial data no guarantee as to the completeness and accuracy of the data shown on this plan can be given. All information, including levels and locations, are not of survey grade accuracy and should be verified on site. For enquiries about the information shown please phone the call centre (09) 839 0400.



**Waitakere City Council**  
Te Taiaro o Waitakere

Development Control Calculations (Net Area)									
	Area (sqm)		Building Cov.		Impermeable Cov.		Permeable Cov.		Outdoor area
	Gross	Net	sqm	%	sqm	%	sqm	%	
Main House			185	21.1					125
Minor unit	875	875	65	7.4	195	22.3	395	45.2	75
Carport			35	4					

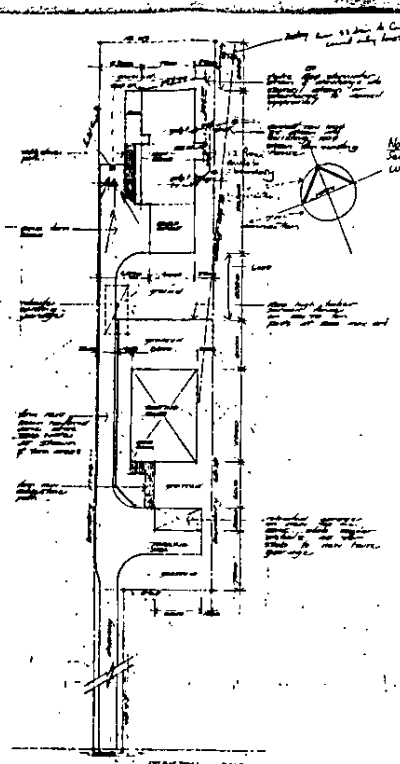
EXISTING EASEMENTS C213489.4			
SHOWN	PURPOSE	SERVIENT TENEMENT	DOMINANT TENEMENT
P	DRAINAGE	LOT 2 PD 140148	LOT 1 PD 140148



Engineering Management And  
Consultancy Services Ltd  
P O Box 67-026  
Mt Eden, Auckland  
Phone : 09-6307125  
Fax : 09-6307126  
Email : emacs@emacsltd.co.nz

# PROPOSED SITE PLAN OF LOT 2 DP 140148 AT 69 MARGAN AVENUE, NEW LYNN

DRAWN BY PV	SCALE 1:200@A3	REV	SHEET No 543/01
CHECKED BY KL	DATE 08.04.09	PROJECT No EMCS09543	
DP 140148	LOT 2		



Site & Drainage Plan 1:200

Legal Description  
 Lot 2402 - CT 107/107  
 Area - 1811 sq. ft.



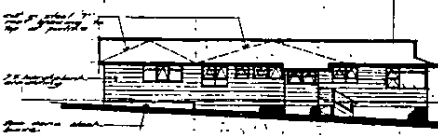
north west elevation



north east elevation



south west elevation



south east elevation

NOTES: 1. ALL WORK TO BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING ACT 1984. 2. THE PROPOSED HOUSE IS TO BE BUILT ON THE SITE OF THE EXISTING HOUSE. 3. THE PROPOSED HOUSE IS TO BE BUILT ON THE SITE OF THE EXISTING HOUSE.

NEW LIME RENDERING COURSE APPROVED FOR USE OF BUILDING PERMIT OFFICE. 1. ALL WORK TO BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING ACT 1984. 2. THE PROPOSED HOUSE IS TO BE BUILT ON THE SITE OF THE EXISTING HOUSE. 3. THE PROPOSED HOUSE IS TO BE BUILT ON THE SITE OF THE EXISTING HOUSE.

Site & Drainage Plan Elevations

NEW HOUSE  
 1:200  
 3/3

Report Date 04/12/2009 08:43 AM

Submitted By

Video - 988472

Page 1

Service # 983614  
Problem CCTVE CCTV - EMERGENCY  
Address 69 MARGAN AVE  
NEW LYNN 0600

Call Date 16/11/2009 09:20 Priority E 1 Duration of Call 00:00  
Taken By EJB BURWELL, JACI Responsibility WKS TECHSCAPE # of Calls 1  
Source Project  
☐ Customer Contact Requested Budget #

Service Request Progress

Schedule (resolved)  
Inspect Inspected from 16/11/2009 10:00 AM to 16/11/2009 10:00 AM by BBS BBS.  
Resolve Resolved at 16/11/2009 12:00 PM with code WRES RESOLVED BY TECHSCAPE. Additional work orders have been completed.

Location 69 MARGAN AVENUE, NEW LYNN

Area Sub-Area  
District Map #  
Parcel  
Template Type A/P #  
Set

Primary Caller

Name WAITAKERE CITY COUNCIL Title  
First,MI  
Address  
City HENDERSON  
State/Province ZIP/PC 0650  
Country ☐ Foreign Reference #  
E-Mail  
Day Phone 8368000 Evening Phone  
Call Date 16/11/2009 09:20 Taken By EJB  
Comments  
Problem Address: 69 MARGAN AVENUE NEW LYNN 0600. 16-NOV-2009 09:22:18: AS PER JASON/JAYESH PLEASE CCTVR MANHOLE FOUND IN #69 AND TRACK UPSTREAM TO SEE HOW FAR IT GOES. PLEASE CONTACT JASON WHEN THIS IS COMPLETED - JACI 161109

Call List

There are no additional callers for this service number

Comments

Problem Address: 69 MARGAN AVENUE NEW LYNN 0600. 16-NOV-2009 09:22:18: AS PER JASON/JAYESH PLEASE CCTVR MANHOLE FOUND IN #69 AND TRACK UPSTREAM TO SEE HOW FAR IT GOES. PLEASE CONTACT JASON WHEN THIS IS COMPLETED - JACI 161109  
BBS: Nov 18 2009 1:43PM -----  
C.C.T.VED FROM UNMARKED MANHOLE IN 69 MARGAN AVE UP TOWARDS 33 ISLINGTON ST,LINE IS PARTIALLY BLOCKED BY ROOTS IN 33 ISLINGTON ST,LINE IS MARKED ON BOUNDRY (tandrews 18/11 01:43)  
BBS: Nov 23 2009 10:56AM -----  
C.C.T.VED FROM UNMARKED MANHOLE IN 69 MARGAN AVE UP TOWARDS 33 ISLINGTON ST,LINE IS PARTIALLY BLOCKED BY ROOTS IN 33 ISLINGTON ST,LINE IS MARKED ON BOUNDRY (tandrews 18/11 01:43) (kfraser 23/11 10:56)

Comments

Inspected				Resolution			
By	Date	Time	Code	Date	Time	Code	Time

**RATE ACCOUNT No. 6003139**

For Period 01 Jul 2009 To 30 Jun 2010  
Instalment No. 3  
Invoice Date 01 Feb 2010  
Due Date 22 Feb 2010  
(last date for payment)  
Tax Invoice G.S.T. Reg. No. 52-211-247

NEW ZEALAND HOUSING FOUNDATION  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

19 FEB 2010

Settling 24/2/10

Valuation No. 33650-27034  
Description of Property  
LOT 32 DP 389289  
Residential And Other Uses  
Property Area 0.035 Ha  
Land Value 155000  
Capital Value 155000  
Special Land Value  
Postponement Value

Property Location  
19 Titch Place, Glen Eden

Note : Payments received after 15 Feb 2010 are not included in this notice.  
An Additional 10%(\$39.73) will be added to the current instalment if not paid on or before 22 Feb 2010

Instal.	Amount	Penalty Date
1	397.30	20 Aug 2009
2	397.30	20 Nov 2009
3	397.30	22 Feb 2010
4	397.36	20 May 2010

**Statement of Account Tax Invoice This Instalment**

Unpaid Rates From Previous Year 01 Jul 2009	0.00
Previous Instalments	794.60
Penalties Added	0.00
Penalties Remitted	0.00
Adjustments	0.00
Payments Made To 15 Feb 2010	794.60 cr
This Instalment (Incl. G.S.T.)	397.30

**AMOUNT NOW DUE \$ 397.30**  
**No Later Than 22 Feb 2010**

Total Payment To Clear Account \$794.66  
To June 2010  
If Paid by 22 Feb 2010

DESCRIPTION OF RATES	Factor / Units	Value of Factor	Rate / Charge	Total Rates
Water Uniform Charge	Per sep used/inhabited pt of rating unit	1	419	\$419.00
General Rate - Step 1	Land Value	155000	0.002876	\$445.76
Annual General Charge	Per sep used/inhabited pt of rating unit	1	720	\$720.00
by World Cup Levy	Per sep used/inhabited pt of rating unit	1	4.5	\$4.50

General Rate includes contributions to: \* Auckland Regional Amenities Funding Levy of \$9.45  
\* Auckland War Memorial Museum Levy of \$28.50  
\* ATAT Levy of \$10.69

Water Rates will be separately invoiced twice yearly based on the consumption recorded by meter @ 81 cents per 1000 litres.

<b>TOTAL FOR YEAR \$</b> (Incl. G.S.T.)	<b>\$1,589.26</b>
G.S.T. Content of Annual Rate	<b>\$176.56</b>

For further Payment Options see reverse

**Rates Remittance Advice**

Use this form when making payment at the ANZ, Council Offices or by mail. If paying by mail receipts will only be issued if requested.

Next Date for Payment 22 Feb 2010



Payable through any branch of the ANZ  
through any office or by mail to the Waitakere City Council.  
Like cheques payable to Waitakere City Council.  
Please write your address and phone number on back of cheque.

For: **NEW ZEALAND HOUSING FOUNDATION**

Signature of Cheques

Bank

Branch

Rate Account No. 6003139

**Amount Due \$397.30**

**Amount Paid**

**Cheque:**

**Total \$**

**CREDIT WAITAKERE CITY COUNCIL - RATES ACCOUNT**

Staples. Do Not Fold.

11 1006003139 0101021 0451400005 11 64

**Inspection Fee Reconciliation**

**Application Number:**

**COM-2009-1374**

**Address:**

**19 Titch Place, GLEN EDEN**

<b>Inspection Reconciliation</b>		
Number of inspections invoiced at granting	15	
Extra inspections invoiced during construction	1	
Inspections invoiced on Amendments		
Inspections fees credited		
<b>Total Inspections Invoiced</b>	<b>16</b>	
Less number of chargeable inspections carried out	14	
Number of non-chargeable inspections	3	
<b>Difference</b>	<b>-2</b>	
Rate per inspection (update rate if required)	\$ 178.00	
Inspection Reconciliation Total		-356.00
<b>Other Fees</b>		
Code Compliance Certificate fee		
Other fees yet to be invoiced (EcoWater)		266
Inspections over 1 hour		
<b>Invoice / Credit Note Total</b>		<b>-90.00</b>
<b>Other unpaid invoices</b>		
<b>Total</b>		<b>-90.00</b>

Name: Nicole Daniels

Date: 16/4/2010

# TAX INVOICE

**GST Registration Number**

**52-211-247**

**NEW ZEALAND HOUSING FOUNDATION**  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

**Date:** 12 April 2010  
**Customer No:** 302176  
**Invoice No:** 456863

**Application Location:** 19 Titch Place, Glen Eden

**Application:** COM-2009-1374

Fee Code	Transaction Description	Amount
ECWPRO	Drainage Engineer - Ecowater Processing Fee	266.00

**COPY**

*This account includes a total GST content of \$29.55*

**Invoice Total** 266.00  
**Invoice Due** 26 April 2010

**Remittance Advice :**

(Please Detach and return with payment)

<b>Invoice Date:</b>	12 April 2010	<b>Application:</b>	DAP
<b>Invoice Number:</b>	456863	<b>Debtor Number:</b>	302176
<b>Name:</b>	NEW ZEALAND HOUSING FOUNDATION	<b>Payment Reference:</b>	370179
<b>Application:</b>	COM-2009-1374	<b>Invoice Total:</b>	266.00

# CREDIT NOTE

**GST Registration Number**

**52-211-247**

**NEW ZEALAND HOUSING FOUNDATION**  
PO Box 44018  
Point Chevalier  
AUCKLAND 1246

**Date:** 16-Apr-2010  
**Customer No:** 302176  
**Credit Note No:** 520445

**Application Location:** 19 Titch Place, Glen Eden

**Application:** COM-2009-1374

Fee Code	Transaction Description	Amount
INSBSE	Base Inspection Fees	-356.00

*This account includes a total GST content of -39.55*

**Credit Note Total** -356.00

**Remittance Advice :**  
(Please Detach and return with payment)

**Credit Note Date:** 16-Apr-2010

**Application:** DAP

**Credit Note Number:** 520445

**Debtor Number:** 302176

**Name:** NEW ZEALAND HOUSING  
FOUNDATION

**Payment Reference:** 370179

**Application:** COM-2009-1374

**Credit Note Total:** -356.00



WEST COAST ROAD  
WAITAKERE CITY  
HOUSING DEVELOPMENT

for

NZ HOUSING FOUNDATION

---

SUPPLEMENTARY GEOTECHNICAL  
ASSESSMENT REPORT

---

Ref: 42608  
November 2006

*Architects · Consulting Engineers · Surveyors · Project Managers*

**Client:** NZ Housing Foundation

**Project:** West Coast Road Housing Development

**Job Number:** 42608

**Report Title:** Supplementary Geotechnical Assessment

**Document Reference:** BDOC03004368

**Report Date:** November 2006

-	27/11/06	First Issue	R J Allison	M J D Stapleton
<b>Issue</b>	<b>Date</b>	<b>Status</b>	<b>Prepared By</b>	<b>Reviewed By</b>

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### **Appendix A: Drawings**

Site Location Plan	Drawing No. 42608/G01
Borehole Location Plan (Sheet 1)	Drawing No. 42608/G02
Borehole Location Plan (Sheet 2)	Drawing No. 42608/G03
Preliminary Cut and Fill Isopac Plan (Sheet 1)	Drawing No. 42608/G04
Preliminary Cut and Fill Isopac Plan (Sheet 2)	Drawing No. 42608/G05

### **Appendix B: Geotechnical Investigations**

Summaries of Soil Profile and Testing  
Explanation of Terms and Symbols

### **Appendix C: Laboratory Testing**

Geotechnical Test Reports

### **Appendix D: Slope Stability Analysis**

Summary of Graphical Output from G Slope Analysis

## **1.0 INTRODUCTION**

Babbage Consultants Ltd (Babbage) were appointed by NZ Housing Foundation to carry out a geotechnical investigation to support subdivision and earthworks consent applications for the proposed residential development at 423 to 429 West Coast Road, Glen Eden in Waitakere City.

The results of the geotechnical investigation and recommendations for the development of the site were presented in a report by Babbage dated June 2006 (Ref: BDOC02880325). The recommendations included that an additional geotechnical investigation should be carried out to support detailed design of the earthworks in the vicinity of the proposed fill batter adjacent to the 100 year flood level. In particular, to determine the consolidation characteristics of the soils beneath the proposed fill batter within the Stage 2 development.

This report presents the results of the supplementary geotechnical investigation and provides recommendations for detailed design of the earthworks.

## **2.0 SITE DESCRIPTION**

### **2.1 LOCATION AND TOPOGRAPHY**

The site is located at 423-429 West Coast Road, Glen Eden in Waitakere City, as shown on the Site Location Plan in Appendix A.

The site covers an area of approximately 5.7 hectares and is bound to the south by West Coast Road and to the east by Woodbank Drive and associated residential development. Most of the western boundary is generally marked by Parrs Stream that flows northwards into the Waikumete Stream that flows approximately parallel to the northern boundary. However, in the south west the boundary extends westward of Parrs Stream to the existing residential development off Albionvale Road.

The site generally comprises rough grassland with areas of scrubby bush and exotic trees in the vicinity of the stream with small localised areas of thicker

bush in the southern and northern parts of the site. A line of mature pine trees trend east west across the southern part of the site. A stormwater pond is located in the south western part of the site to the west of Parrs Stream.

The land generally slopes gently downwards towards Parrs Stream. The existing ground levels in the southern part of the site reduce from approximately RL32m in the south east to approximately RL24m in the vicinity of the stream. Over the southern and central part of the site the existing slope gradients are typically between 1(v) in 3.5(h) to 1(v) in 6(h).

In the northern part of the site the ground level generally reduces from approximately RL29m close to Titch Place on the eastern boundary to approximately RL18m adjacent to the northern boundary.

From the walkover survey there are no apparent signs of significant previous slope instability, although much of the site is heavily vegetated with grass and bush and therefore this may mask such features as shallow scarps.

## **2.2 AERIAL PHOTOGRAPHS**

To assess possible previous areas of fill placement on the site, aerial photographs from 1940, 1959 and 2001 were viewed. The photographs indicate the site has remained largely unchanged, with the exception of some minor residential development in the south eastern part of the site and the construction of the stormwater pond in approximately 2001. The residential development appears to have comprised a single dwelling in 1940 with additional outbuildings being evident in 1959. These buildings are not evident in 2001.

Minor areas of fill appear to have been placed in the vicinity of the eastern boundaries in the central and northern part of the site, associated with the construction of the residential dwellings along Woodbank Drive. Fill also appears to have been placed to form the eastern side of the existing stormwater pond.

No significant signs of instability were identified in the air photos reviewed for this report.

### 3.0 PROPOSED DEVELOPMENT

The proposed development is for a residential subdivision of approximately 60 lots, to be constructed in three stages. Stage 1 includes the northern part of the site, Stage 2 the south eastern and Stage 3 the south western. In addition it is proposed to replace the existing stormwater pond in the south western part of the site with swales and construct a new stormwater pond in the north western corner of the site.

A footbridge is also to be proposed to link the Stage 1 area to the land to the west of Parr's Stream.

A preliminary development layout is shown on the Borehole Location Plans (Sheets 1 and 2) in Appendix A.

The majority of the proposed residential dwellings are understood to comprise two storey structures, although Stage 3 is understood to comprise two and three storey structures with basement level parking although the parking space may not be enclosed.

Significant earthworks are to be carried out to develop the site to form a series of building platforms rising from the 100 year flood level adjacent to the stream. In Stage 1, preliminary earthworks design indicate cut depths of approximately 4.5m over the central part of the site and the placement of up to 1.5m of fill adjacent to the 100 year flood level along the margins of the stream.

In Stage 2, it is proposed to construct a significant fill platform above the 100 year flood level between a new access road and the stream. The proposed fill heights range from approximately 1.5m in the southern end to 3.5m in the northern end of the fill. Some cut of the land adjacent to the eastern boundary is proposed, with the depth of cut ranging from approximately 2.75m in the south east corner to 1m in the north west corner.

In Stage 3, maximum cut depths are anticipated to be approximately 3.0m with maximum fill heights of approximately 2.0m.

It is understood that no retaining structures are permitted to be constructed immediately adjacent to the flood plain and therefore fill batters are proposed along the 100 year flood level. Remote from the flood plain, retaining structures are proposed to support areas of cut and fill where significant changes in ground level occur between the various building platforms and access roads.

The preliminary earthworks plan is shown on Drawing No's 42608/G04 and G05 in Appendix A.

#### 4.0 SITE INVESTIGATION

The initial fieldwork was carried out between the 22<sup>nd</sup> and 25<sup>th</sup> May 2006 and comprised 23 No hand auger boreholes to depths of between 0.8m and 3.15m below ground level (bgl), designated HA1 to HA23.

The additional fieldwork was carried out between the 18<sup>th</sup> and 25<sup>th</sup> July 2006 and comprised 4 No machine boreholes to depths of between 9m and 14m bgl, designated BH1 to BH4. The approximate location of the boreholes is shown on the Borehole Location Plan (Drawing No's 42608/G02 and G03) included in Appendix A.

The machine boreholes were sunk using rotary open barrel techniques with water flush. Undisturbed tube samples were taken at selected depths within the machine boreholes. The soil and core recovered from the boreholes was logged by a Babbage Engineering Geologist. The core and bagged disturbed samples recovered from the machine boreholes were returned to the Babbage Geotechnical Laboratory for inspection and testing.

In situ testing in the boreholes consisted of standard penetration tests (SPT) at selected intervals. In addition, the in situ shear strength of the materials encountered in the boreholes was measured at selected depths using a hand-held Pilcon Shear Vane. The stratigraphy encountered in the boreholes and the

results of the in situ tests are presented in the Borehole Summaries in Appendix B.

## 5.0 LABORATORY TESTING

The following tests were carried out on samples recovered from the boreholes:

- |  |       |
|--|-------|
| • Moisture Content                     | 22 No |
| • Plasticity Index                     | 3 No  |
| • Quick Undrained Triaxial Compression | 2 No  |
| • One Dimensional Consolidation        | 3 No  |

The results of the above tests are presented in the Babbage Geotechnical Laboratory Report in Appendix C. In addition, the results of the moisture content and plasticity indices are included on the Summaries of Soil Profile and Testing in Appendix B.

## 6.0 GEOLOGY AND STRATIGRAPHY

### 6.1 GEOLOGY

The IGNS's Geological Map of the Auckland Urban Area, 1:50,000, Sheet R11, 1992 indicates the geology at the site to generally comprise deposits of the Puketoka Formation comprising pumiceous muds, sands and gravels with muddy peat and lignite.

### 6.2 STRATIGRAPHY

The ground conditions, as indicated in the machine boreholes, generally confirm the anticipated geology, and generally comprise a sequence of clays with organic horizons, interbedded with silt and sand horizons.

In BH1 and BH4 the clay is generally firm / firm to stiff between approximately 2m to 3m and 5m to 6m below ground level (bgl). These clays are generally

highly plastic and range in colour from light brownish grey and orange to blue grey. In BH2 and BH3 the results of the vane shear tests do not indicate a similar reduction in peak undrained shear strength, the clays generally being stiff / stiff to very stiff in consistency.

A 0.6m to 0.9m thick layer of fine to medium grained sand was encountered in boreholes BH2, BH3 and BH4 at depths of between 3.2m and 8.0m bgl. The results of Standard Penetration Tests (SPT's) carried out within the sands indicates them to be loose to medium dense.

## **7.0 GROUNDWATER CONDITIONS**

Groundwater strikes were not recorded in the boreholes since water flush was used in the drilling process which masked any seepages. However, groundwater seepages were recorded in the previous adjacent hand auger boreholes at depths of between 0.1m and 1.6m bgl during the fieldwork.

No long term monitoring of the local groundwater regime was carried out.

## **8.0 DISCUSSION**

### **8.1 GENERAL**

Previous discussion and recommendations is included in our Geotechnical Assessment Report dated June 2006 referenced in Section 1 and should be read in conjunction with this report.

### **8.2 STABILITY**

From a previous review of aerial photographs and observations made during the walkover survey, there do not appear to be any signs of significant instability on the site.

The proposed fill embankments along the 100 year flood level are indicated to be at gradients of 1(v) to 2(h) and range in height from approximately 1.5m to

3.0m. The findings of the machine boreholes indicate the soft to firm material previously encountered in boreholes HA7, HA11 and HA12 between approximately 1m and 2m bgl appears to be localised. In BH1 the clays were generally firm to stiff / stiff to 2.5m depth and firm from 2.5m to 5.5m bgl, with no soft material being encountered. However, the result of a single triaxial compression test carried out on a sample of clay from BH1 at 1.5m bgl indicates the undrained shear strength to be 27kPa. This is approximately half the value measured with the hand shear vane at the same depth and may be partly attributed to sample disturbance. However, the result does correlate with the values obtained at similar depths from the hand shear vanes carried out within boreholes HA11 and HA12.

In boreholes BH2 and BH3 the clays were generally stiff / stiff to very stiff in consistency.

Preliminary stability assessments using G Slope software have been carried out to assess / infer a factor of safety of the existing slope (Section AA on Drawing G03) and of the proposed embankment (Section BB on Drawing G03). Section AA was selected since it represents a steeper part of the site with an underlying layer of soft to firm clay, as indicated from the hand auger boreholes. Section BB was selected to represent a typical section through a higher part of the proposed embankment. Whilst the soft to firm layer of clay was not encountered in borehole BH2, it has been included to represent a "worst case" scenario.

The Bishop simplified method of analysis for circular failure has been used in the analysis. The soil parameters used in the analysis were based on our previous experience in similar soils and considered to be moderately conservative. They are summarised in the following table:

Soil Type	Unit Weight (kN/m <sup>3</sup> )	Effective Cohesion c' (kPa)	Effective Friction Angle Ø' (degrees)
FILL	17	5	30
CLAY Soft to Firm	18	2	27
CLAY Stiff	18	5	30
CLAY Very Stiff	20	7	32

The results of the stability analyses indicate that the factor of safety against failure for the existing slope (Section AA') is greater than 1.5 for a partially saturated slope, which is considered to represent moderately conservative conditions. For a fully saturated slope the factor of safety is indicated to reduce to approximately 1.1. This is considered satisfactory since a fully saturated slope, in our opinion, represents worst credible conditions.

In the case of Section BB', the results of the stability analysis indicate the factor of safety against failure of the proposed embankment batter, assuming unsaturated conditions, is approximately 1.8. However, for a groundwater surface at the base of the fill, approximately coincident with the existing ground surface, the factor of safety reduces to approximately 1.4. Since the findings of the boreholes indicate the layer of soft to firm clay modelled in the analysis is not continuous beneath the proposed embankment, we consider that this represents worst credible conditions. It is therefore our opinion that the indicated factor of safety against failure is satisfactory.

A summary of the graphical output from the G Slope analysis is included in Appendix D.

In order to minimise surface erosion of the embankment batter from surface runoff and consequential frittering and localised surface creep and shallow slumping, we consider that a vegetative cover should be developed over the slope of the embankment. To protect the embankment surface until vegetative cover is established and aid the development of the vegetative cover we consider a biodegradable mat should be installed on the slope rather than a thick layer of mulch and / or topsoil. Both mulch and topsoil can, prior to the

establishment of a well rooted vegetative cover, cause surface saturation and near surface movement. We consider the use of matting to reduce infiltration should assist in short term protection of the slope.

In addition, overland flow over the slope will need to be controlled. Rather than permit sheet flow over the slope it is recommended that the flow is directed into drains at selected intervals along the slope. The base of the drains should be formed from low permeable material to prevent erosion of the underlying soil and their discharge should be directed away from the base of the slope.

### 8.3 EARTHWORKS

As discussed in Section 3, significant earthworks are proposed on site to achieve the required platform levels for the proposed structures and access roads. The maximum depth of cut is approximately 4.5m in the central part of the Stage 1 area whilst the maximum thickness of fill is approximately 3.5m along the 100 year flood level in the Stage 2 area.

In the case of the proposed fill batters to be constructed along the 100 year flood level, the placement of between 2m and 3.5m of fill will result in consolidation settlement of the underlying soils. The magnitude of this consolidation settlement and the rate at which it occurs will be largely controlled by the compressibility and permeability of the underlying soils. The findings of the hand auger boreholes indicate that in the Stage 1 area, the soils are likely to comprise stiff to very stiff sandy clays of moderate plasticity. However, in the Stage 2 area, the clays are indicated to be soft to firm, organic and of high plasticity. The results of laboratory consolidation tests carried out on samples recovered from the machine boreholes indicate the clays to be medium to high compressibility.

Based on the above, it is our opinion that whilst consolidation settlement beneath the proposed fill batters in the Stage 1 may generally be less than 25mm, assuming medium compressibility clays are present, in the Stage 2 area, preliminary calculations indicate consolidation settlement of approximately 50mm to 100mm may result beneath parts of the fill batters. The time period for 50% and 90% of this consolidation settlement to occur, is indicated from the

laboratory tests to be approximately 6 months and 30 months respectively. Therefore, it is anticipated that additional drainage will be required to reduce the drainage path and thereby reduce the period over which 90% consolidation occurs. Preliminary analysis indicates that for a drainage path of approximately 3m the period for 90% consolidation to occur may be reduced to approximately 12 months. Pre-loading the area would increase the rate of settlement and reduce the period over which 90% consolidation occurs.

In order to minimise the effect of consolidation settlement on the proposed structures, we consider that the fill in the Stage 2 area should be placed during the initial stages of development and subsequent construction delayed for a minimum period of 6 months. The settlement of the fill should be monitored during this period to confirm the rate and amount of settlement taking place, thereby providing confidence in the assessment of likely settlement after development to ensure that it is within acceptable limits.

The placement of up to 3.5m of fill and any additional preload, on the soft to firm clays will require to be carried out under strict control in order to avoid potential bearing capacity failure of the underlying clays. The clay is indicated to have an undrained shear strength of 18kPa at 1m bgl in HA11 0.2m below the underside of topsoil in that location. We note this strength will not support conventional construction plant and the topsoil would also require removal using a hydraulic excavator rather than a motorscraper. This soft to firm soil is susceptible to bearing capacity failure for applied bearing pressures in excess of approximately 35kPa. If the full height of fill is placed over a short period of time and no drainage is installed within the underlying clays, it is our opinion that localised bearing capacity failure of the soft to firm clays may occur.

In order to minimise the risk of bearing capacity failure beneath the fill batter it is recommended that additional vertical drainage is installed beneath the area of fill and the rate of filling is strictly controlled to permit the dissipation of excess pore pressures within the underlying clays. This may be achieved by installing vertical "wick" drains and a drainage blanket prior to filling. Alternatively, consideration may be given to installing counterfort drains or stone columns instead of "wick" drains. These would have the advantage of providing additional vertical support to the fill batter. In the case of counterfort drains, the

presence of shallow groundwater and low strength clays may make excavation of trenches to depths of between 3m and 4m problematic.

Preliminary analysis indicate counterfort drains should be installed at a maximum lateral spacing of 6m and be a minimum depth of 3m. They should be excavated parallel to the slope and extend 1m to 2m beyond the toe and crest of the slope batter. The drainage aggregate will require to be sufficiently graded to prevent clogging and maintain adequate flow and therefore a 20/7 aggregate is likely to be suitable. The arisings from the excavation are anticipated to largely comprise saturated highly plastic clays with organics and therefore be largely unsuitable for re-use. As such, the majority of this material may require to be disposed of off site.

Prior to the placement of fill it is expected that some form of subsoil drainage will be installed to ensure that groundwater seepage is not impeded by the placement of the fill.

Testing and certification of all fill will be required where the thickness exceeds 0.6m or where structures or roads are to be located on the fill.

## **8.4 FOUNDATIONS**

### **8.4.1 Shallow Foundations**

Based on the findings of the investigation it is considered that the foundations for the majority of the proposed structures may be designed in accordance with NZS 3604:1999 "Timber Framed Buildings". This recommendation applies only to foundations within in situ soil or certified fill and no foundations should be founded in topsoil or uncertified fill.

In the case of structures located on the fill adjacent to the 100 year flood level, shallow foundations at a minimum depth of 600mm are considered suitable for structures located no closer than 1.2m from the crest of the 1(v) to 2(h) batter slope. This is to ensure that the foundation is located no closer than a line at a gradient of 1(v) to 3(h) from the toe of the batter and therefore minimise the risk of loss of support should localised frittering / minor creep and movement of the batter slope occur.

In order to minimise differential and total settlements as a result of the variation in thickness of the fill material, it is recommended that strict control is placed on the quality and compaction of the fill beneath the proposed structures. In addition, it is recommended that a serviceability limit state bearing strength of 100kPa is not exceeded for strip or pad foundations constructed within the fill material and that pad sizes should not exceed 1.0m x 1.0m in plan and strip foundations not exceed 1m width. The timing of final development over the fill in the Stage 2 area will however be dependant on consolidation of the materials beneath the fill rather than the strength of the fill itself. Monitoring of the fill should confirm when development is appropriate.

In the case of the proposed structures to be located on Lot 61 to the west of the stream, we understand they are to be two and three storey structures with additional basement car parking. The building platforms for the structures are indicated to be in areas of cut ranging in depth from 0.5m to 3.0m, as shown on Drawing G05 in Appendix A.

The findings of boreholes HA3, HA4 and BH4 indicate the ground conditions in the vicinity of the proposed structures to comprise a 0.3m to 0.9m thick layer of topsoil and / or fill overlying a sequence of stiff and very stiff moderately plastic clays. The results of the hand shear vanes carried out within the uppermost 3m indicate the average undrained shear strength to be approximately 90kPa. However, at approximately 3m to 3.5m bgl the clays are indicated to become locally firm and highly plastic.

Based on the above, it is considered the stiff to very stiff clays are a suitable founding stratum for shallow foundations. However, in areas of proposed deep cut, the firm highly plastic clays may be encountered, and it is our opinion that shallow foundations constructed within these soils may be subject to unacceptable vertical movement post construction. As such measures are likely to be required to mitigate this potentially adverse movement. These measures may include limiting the width of the foundations and applied foundation loads and/or removing the firm clay and replacing with hardfill. Alternatively, the use of pile foundations may be considered.

In the case of shallow foundations founded within the stiff to very stiff clays, it is recommended that a serviceability limit state bearing strength of 100kPa is not exceeded for strip or pad foundations and that pad sizes should not exceed 0.8m x 0.8m in plan and strip foundations not exceed 0.6m width. To minimise the effect of shrinkage and swelling, it is recommended that shallow foundations are founded at least 450mm below finished ground level. Where highly plastic clays occur, the founding depth should be increased to 600mm. However, it is recommended that once formation levels are reached the surface is inspected by a Geotechnical Engineer familiar with this report to confirm the founding depths.

#### **8.4.2 Pile Foundations**

Where structures are located closer than 1.2m to the crest of the 1(v) to 2(h) batter along the 100 year flood level, the use of piled foundations is recommended in order to minimise the risk of loss of support should localised frittering and slumping of the batter slope occur. From the preliminary layouts included on Drawings G04 and G05 it is anticipated that Lots 23, 46, 47, 52 to 55, 57 and 60 will require piled foundations. The design of the piles should consider loss of lateral support from the batter slope below / downslope of the piles, as well as lateral loads that may be imposed from the fill and structure. As such, it is recommended that the total length of pile is at least equivalent to twice the combined unsupported length of pile and depth of fill and that the head of the pile is suitably restrained.

The findings of the boreholes indicate the soils at approximately 3m below the base of the proposed fill embankment generally comprise stiff or very stiff clays and silts / medium dense sands. However, in the case of Lots 46 and 47, the findings of BH1 indicate the presence of firm clay from approximately 2m to 6m bgl.

Based on the above, preliminary calculations to determine the ultimate vertical strength of a single timber pile installed within the firm clay and stiff clay have been carried out and are summarised in the table below:

<b>Founding Stratum</b>	<b>Pile Diameter (mm)</b>	<b>Embedment Depth (m)</b>	<b>Ultimate Vertical Strength (kN)</b>
Firm Clay	300	3.0	120
Firm Clay	300	6.0	215
Stiff Clay	300	3.0	190

The embedment depth above is the length of pile within the natural soils beneath the base of the proposed embankment. It is assumed that no skin friction is mobilised along the shaft of the pile within the fill.

The method of installation of the piles should consider the presence of shallow groundwater and low strength clays and silts, as well as the drainage blanket and vertical / counterfort drains. Collapse of bored piles within the natural soils is considered likely and as such, it is anticipated that pre-boring through the fill embankment and then driving into the underlying natural soils may prove suitable.

If driven piles are adopted then it is recommended the pile capacity is assessed in the field by using Hiley's pile driving formula. For bored piles, a static load test could be carried out.

## 9.0 CONCLUSIONS

Based on the fieldwork covered by this investigation it is considered that the site is suitable for residential subdivision in accordance with the proposed earthworks and subject to the recommendations contained within this report.

## 10.0 RECOMMENDATIONS

- 10.1** It is recommended that all fill be certified beneath areas where development takes place (e.g. beneath buildings, roads etc). In the case of the fill along the 100 year flood level in Stage 2, it is recommended that development planning allows for a delay between completion of earthworks and building development of at least 6 months in order to permit resulting consolidation settlement of the underlying clays. In order to increase the rate of consolidation settlement and minimise the risk of bearing capacity failure beneath the fill batter it is recommended that additional vertical drainage is installed beneath the area of fill and the rate of filling is strictly controlled to permit the dissipation of excess pore pressures within the underlying clays. The vertical drainage may include "wick" drains, counterfort drains or stone columns. The method of installation should consider the presence of low strength clays and high groundwater level..
- 10.2** It is recommended that subsoil drainage is installed beneath areas of fill and in particular to the rear of retaining structures. In addition, the results of the groundwater monitoring indicate that groundwater may be encountered at shallow depth within cut areas and therefore adequate provision for drainage will require to be made in these areas.
- 10.3** It is recommended that a biodegradable mat is installed on the slope batter in order to minimise surface erosion of the embankment batter and to promote a vegetative cover. In addition, overland flow over the slope should be controlled by the installation of drains at selected intervals along the slope. The base of the drains should be formed from low permeable material to prevent erosion of the underlying soil and their discharge should be directed away from the base of the slope.
- 10.4** It is recommended that the foundations for residential dwellings are designed in accordance with NZS 3604:1999, with the exception of those for Lots 23, 46, 47, 52 to 55, 57 and 60 and the two to three storey structures in Stage 3, where specific design will be required. It is recommended that a serviceability limit state bearing strength of 100kPa is not exceeded for strip or pad foundations constructed within the fill material and that pad sizes should not exceed 1.0m x 1.0m in plan and strip foundations not exceed 1m width. It is recommended

that the foundations are founded at least 450mm below finished ground level to take into account possible shrinkage swell affects. Where highly plastic clay forms the founding material then this depth should be increased to 600mm. It is recommended that once formation levels are reached the surface is inspected by a Geotechnical Engineer familiar with this report to confirm the founding depths.

**10.5** Where structures are located closer than 1.2m to the crest of the 1(v) to 2(h) batter along the 100 year flood level, the use of piled foundations is recommended. The design of the piles should consider loss of lateral support from the batter slope, as well as lateral loads that may be imposed from the fill and structure. As such, it is recommended that the total length of pile is at least equivalent to twice the sum of the unsupported length of pile and depth of fill and that the head of the pile is suitably restrained.

**10.6** It is recommended that shallow foundations for the proposed two and three storey structures on Lot 61 are founded within the stiff to very stiff clays and designed using a serviceability limit state bearing strength not exceeding 100kPa and that pad sizes should not exceed 0.8m x 0.8m in plan and strip foundations not exceed 0.6m width. We recommend however that once formation levels are reached the surface is inspected by a Geotechnical Engineer familiar with this report to confirm the founding depths.

## **11.0 LIMITATIONS**

### **11.1 RESTRICTION OF INTENDED PURPOSE**

This report has been prepared solely for the benefit of our client NZ Housing Foundation with respect to the proposed redevelopment of the site, as described in Section 3. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

## 11.2 LEGAL INTERPRETATION

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate legal advice.

## 11.3 RELIABILITY OF INFORMATION

Recommendations and opinions in this report are based on data from the boreholes described in Section 6 of this report. The nature and continuity of subsoil conditions away from the boreholes are inferred and it must be appreciated that actual conditions could vary considerably from the assumed model.

During excavation and construction the site should be examined by a Geotechnical Engineer competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based upon this report.

Babbage would be pleased to provide this service and believe that the project would benefit from such continuity. In any event, it is essential Babbage be advised if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

This report has been prepared by Russell Allison and reviewed by Malcolm Stapleton.

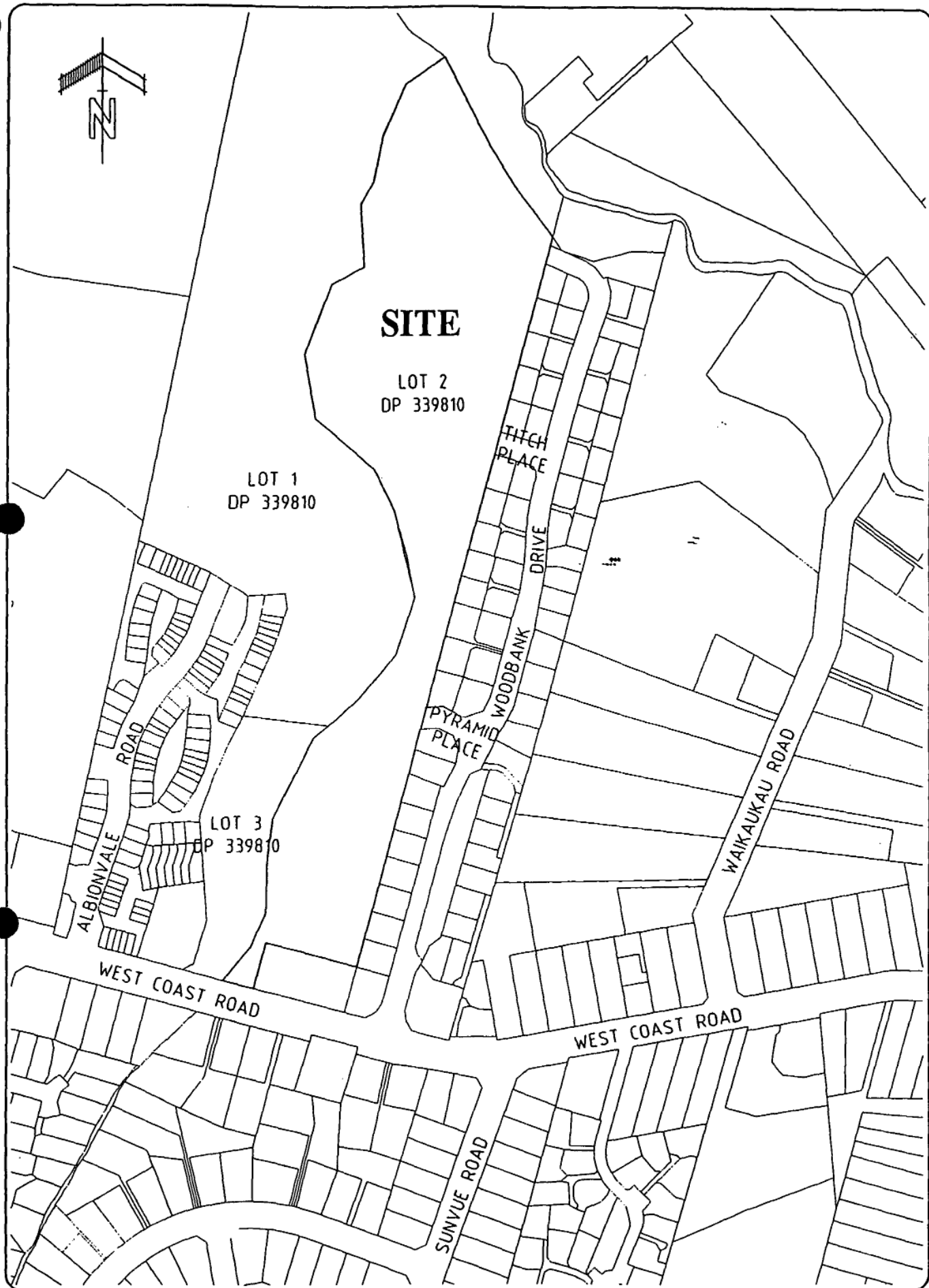
Respectfully submitted  
**Babbage Consultants Limited**



Russell Allison  
**Senior Geotechnical Engineer**  
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## **Appendix A**

### **Drawings**



**Babbage**  
CONSULTANTS

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**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

JOB NO:	42608
TITLE:	SITE LOCALITY PLAN
SCALE:	NOT TO SCALE
DRAWING:	G01

# KEY

	BOUNDARY
	CUT CONTOURS
	FILL CONTOURS
	ZERO CUT/FILL
	EXTENT OF EARTHWORKS
	CALCULATED 100 YEAR FLOOD LEVEL
	EXISTING EASEMENT

## NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS
3. CONTOURS SHOWN ARE TO FINAL DESIGN LEVELS AND NOT TO SUBGRADE LEVELS

ALBION VALE DRIVE

WEST COAST RD

WOODBANK DRIVE

PYRAMID PLACE

LOT 1  
DP 339810

CALCULATED 100  
YEAR FLOOD LEVEL

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK
1	12/01/00	LEVELS AND CUTS	PK	DMR
2	12/01/00	DESCRIPTION	DAVIN	CHECK
3	12/01/00	DESCRIPTION	DAVIN	CHECK
4	12/01/00	DESCRIPTION	DAVIN	CHECK
5	12/01/00	DESCRIPTION	DAVIN	CHECK
6	12/01/00	DESCRIPTION	DAVIN	CHECK
7	12/01/00	DESCRIPTION	DAVIN	CHECK
8	12/01/00	DESCRIPTION	DAVIN	CHECK
9	12/01/00	DESCRIPTION	DAVIN	CHECK
10	12/01/00	DESCRIPTION	DAVIN	CHECK



CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

DRAWING TITLE  
**CUT AND FILL  
ISOPAC PLAN  
(SHEET 2)**

DESIGNED	DATE	INITIAL
DRAWN	JUNE 2000	GW
CHECKED		
APPROVED		

SCALE (A1)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G05	A

# KEY

	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EXISTING FENCELINE
	HA21 HAND AUGER BOREHOLES BY BABBAGE CONSULTANTS - MAY 2006

# NOTES

1. LEVEL DATUM: AUCKLAND VERTICAL DATUM 1947.

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DRAWING NOTES

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHECKED
A	10/10/2006	HAND AUGER BOREHOLE LOCATIONS	HA21	HA22	HA23



CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

DRAWING TITLE  
**BOREHOLE  
LOCATION PLAN  
(SHEET 1)**

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	GMB
CHECKED		
APPROVED		

SCALE (M)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42808	G02	A

# KEY

- EXISTING BOUNDARY
- EXISTING CONTOUR (10m INTERVAL)
- EXISTING CONTOUR (0.5m INTERVAL)
- EXISTING FENCELINE
- HA7 HAND AUGER BOREHOLES BY BABBAGE CONSULTANTS - MAY 2006
- BH4 MACHINE BOREHOLE BY BABBAGE CONSULTANTS - JULY 2006
- SLOPE STABILITY SECTION

# NOTES

1. LEVEL DATUM: AUCKLAND VERTICAL DATUM 1949.

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DRAWING NOTES



REV	DATE	DESCRIPTION	DRAWN	CHECKED
A	16.11.06	MACHINE BOREHOLES AND SLOPE SECTION ADDED	NLS	BA

**Babbage CONSULTANTS**  
ENGINEERS • SURVEYORS • ARCHITECTS

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CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

DRAWING TITLE  
**BOREHOLE  
LOCATION PLAN  
(SHEET 2)**

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	CMB
CHECKED		
APPROVED		

SCALE (A1)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G03	A

	BOUNDARY
	CUT CONTOURS
	FILL CONTOURS
	ZERO CUT/FILL
	EXTENT OF EARTHWORKS
	CALCULATED 100 YEAR FLOOD LEVEL
	EXISTING EASEMENT

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.  
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS  
3. CONTOURS SHOWN ARE TO FINAL DESIGN LEVELS AND NOT TO SUBGRADE LEVELS

CALCULATED 100 YEAR FLOOD LEVEL

## DRAINAGE EASEMENT

#### GAS PIPELINE EASEMENT

TITCH PLACE

WOODBANK DRIVE

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**DRAWING NOTES**

[illegible]

100 PANDYWAY DRIVE  
AUCKLAND 1 - NEW ZEALAND  
PHONE 09-379 8800 • FAX 09-377 1177  
a1@rediffmail.com

CLIENT / PROJECT

WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

DRAWING TITLE

CUT AND FILL  
ISOPAC PLAN  
(SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	OW
CHECKED		
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G04	A

# **Appendix B**

## **Geotechnical Investigations**

PROJECT:

**WEST COAST ROAD, HENDERSON**

HOLE No.

BH4

DATE STARTED: 25/07/2006

METHOD: OB/SPT/TU/WD

RIG: Kubota STV40 Tractor Rio

**SHEET 1 of 3**

DATE FINISHED: 25/07/2006


DRILLED BY: Prodrill (Auck) Ltd.

FLUID: water

LOGGED BY: J. Franklin

[illegible]

Remarks: The boundary between the Puketoka Formation and underlying Waitemata Group is very indistinct and is only approximate. IWGR = inferred Waitemata Group Rock.

		SUMMARY OF SOIL PROFILE & TESTING				JOB No. 42608/GE											
PROJECT:		WEST COAST ROAD, HENDERSON				HOLE No. BH4											
DATE STARTED: 25/07/2006		METHOD: OB/SPT/TU/WD		RIG: Kubota STV40 Tractor Rig		SHEET 2 of 3											
DATE FINISHED: 25/07/2006		DRILLED BY: Prodrill (Auck) Ltd.		FLUID: water		LOGGED BY: J. Franklin											
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS												
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = +  IN SITU VANE (kPa) = ✱						OTHER TESTS	
										20	40	60	80	100	150	Corrected Shear Vane Result **  U = peak / R = remoulded  SPT / Scala Penetrometer 17/2/2 N = 4	
						S3	SPT	100	4								
						WD	0										
5.75						T1	TU	100									
6.00		CLAY, with minor medium to coarse sand-sized lumps of cemented silt, very stiff, moderately plastic, dark grey with occasional white flecks, moist.															
		Assumed core loss.															
6.90							OB	55									
		CLAY, trace fine sand, trace silt, stiff, highly plastic, light grey with occasional black mottles, moist, occasional organics.															
7.50																	
7.70		ORGANIC CLAY, minor fine sand, minor silt, firm, highly plastic, dark brown with black mottles, moist, organic fragments. CLAY, as at 6.9m				S4	SPT	100	5							94.1 ●	
8.05																	
		SAND, fine to medium, some silt, minor clay, non-plastic, light grey, slightly moist.															
8.40		Very silty.					OB	100									
8.75																	
		ORGANIC CLAY, minor fine sand, minor silt, firm, highly plastic, dark brown with black mottles, moist, organic fragments.															
9.25						T2	TU	100									
		CLAY, trace fine sand, trace silt, very stiff, moderately plastic, light grey, slightly moist.															
10.00																	

\*\* IN HOUSE METHOD BASED ON BS1377

14/8/06

LOG OF BORING H:\PROJECTS\42608\542608 WEST COAST ROAD\42608 GE WEST COAST



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608/GE

PROJECT:

WEST COAST ROAD, HENDERSON

HOLE No.

BH4

DATE STARTED: 25/07/2006

METHOD: OB/SPT/TU/WD

RIG: Kubota STV40 Tractor Rig

SHEET 3 of 3

DATE FINISHED: 25/07/2006

DRILLED BY: Prodrill (Auck) Ltd.

FLUID: water

LOGGED BY: J. Franklin

DEPTH (m)		SOIL/ROCK DESCRIPTION					SAMPLES RECOVERED & TEST RESULTS											
		SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +  IN SITU VANE (kPa) = ✱						OTHER TESTS	
											20      40      60			Corrected Shear Vane Result **  U = peak / R = remoulded				
											50      100      150				SPT / Scala Penetrometer			
		Increasing fine sand.		PUKETOKA FORMATION (TAURANGA FORMATION)				OB	100									
		Minor fine sand.																
		Trace fine sand.					S5	SPT	100	13					●	✱		126kPa (U) 42kPa (R) 5/6/7 N = 13
		Grey with thin bands of fine sandy CLAY.							OB	67						✱		91kPa (U) 44kPa (R)
12.00																		
		Grades to CLAY, trace fine sand, trace silt, very stiff, moderately plastic, dark grey, slightly moist, with regular bands of fine sandy CLAY.														✱		116kPa (U) 31kPa (R) 4/5/7 N = 12
12.50																		
12.60																		
13.20																		
13.30																		
13.50																		
		Solid nose SPT at 13.5m																unable to penetrate  12 / 20 / 30 blows for 90mm penetration
13.89																		
		End of Borehole at 13.89 m																

Remarks: The boundary between the Puketoka Formation and underlying Waitemata Group is very indistinct and is only approximate. IWGR = inferred Waitemata Group Rock.

PROJECT:

**WEST COAST ROAD, HENDERSON**

HOLE No.

**BH3**

DATE STARTED: 19/07/2006

METHOD: OB/SPT/TT

RIG: track mounted excavator rig

SHEET 1 of 2

DATE FINISHED: 19/07/2006


DRILLED BY: Prodrill (Auck) Ltd.

FLUID: water

LOGGED BY: J. Franklin / H. Singh

[illegible]

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608/GE						
		PROJECT: WEST COAST ROAD, HENDERSON						HOLE No. BH3						
DATE STARTED: 19/07/2006		METHOD: OB/SPT/TT		RIG: track mounted excavator rig		SHEET 2 of 2								
DATE FINISHED: 19/07/2006		DRILLED BY: Prodrill (Auck) Ltd.		FLUID: water		LOGGED BY: J. Franklin / H. Singh								
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS	
										LIMITS: PLASTIC = X LIQUID = + IN SITU VANE (kPa) = *				
										20	40	60		
		Minor fine sand.					OB	95						149kPa (U) 40kPa (R)
		Some fine sand.												
6.00		Some fine to medium sand.												110kPa (U) 36kPa (R) 2/4/5 N = 9
		Grades to CLAY, fine to medium sandy, minor silt, very stiff, moderately plastic, light grey with white flecks, slightly moist.	WAITEMATA GROUP SOIL			S4	SPT	100	9					
6.70	x x x	SILT, clayey, hard, slightly plastic, light grey, slightly moist, weakly cemented.												10/11/12 N = 23
6.85	x x x	SILTSTONE, very weak, completely weathered, grey to dark grey.												
7.00	x x x	SANDSTONE, fine, very weak, well cemented, completely weathered.												
7.10	x x x	SILTSTONE, very weak, completely weathered, grey to dark grey, some sub-vertical fractures.												
7.30	x x x	SANDSTONE, fine, very weak, well cemented, completely weathered.												
7.50	x x x	Solid nose SPT at 7.5m - material recovered in core barrel appeared to be siltstone.	WAITEMATA GROUP ROCK			S5	SPT	0	23					
8.00														50 blows for 75mm penetration
8.20		SANDSTONE, fine, very weak to weak, very well cemented, highly weathered, grey, some sub-vertical white veins.												
9.00														
9.08		Solid nose SPT at 9.0m				S6	SPT	0						
		End of Borehole at 9.075 m												

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608/GE

PROJECT:

WEST COAST ROAD, HENDERSON

HOLE No.

BH2

DATE STARTED: 18/07/2006

METHOD: OB/SPT/TU/WD

RIG: track mounted excavator rig

SHEET 1 of 2

DATE FINISHED: 18/07/2006

DRILLED BY: Prodrill (Auck) Ltd.

FLUID: water

LOGGED BY: J. Franklin / H. Singh

DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS												
	SOIL SYMBOL	DATUM: Ground Surface	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●						OTHER TESTS	
		SURFACE ELEVATION:								LIMITS: PLASTIC = X      LIQUID = +			Corrected Shear Vane Result **				
										IN SITU VANE (kPa) = ✱				U = peak / R = remoulded			
		For an explanation of the terms & symbols used see attached sheets.								20	40	60	SPT / Scala Penetrometer				
										50	100	150					
0.20		SILT, fine sandy, some clay, stiff to very stiff, moderately plastic, dark brownish grey, moist.	PUKETOKA FORMATION (TAURANGA FORMATION)	NR			OB	90									
0.60		SILT, fine sandy, clayey, stiff to very stiff, slightly to moderately plastic, banded orange and light grey, moist.														102kPa (U) 15kPa (R)	
0.90		CLAY, fine sandy, some silt, stiff, moderately plastic, mottled grey, light grey and orange, moist.								OB	100						
1.00		CLAY, some fine sand, minor silt, stiff to very stiff, moderately plastic, mottled orange and light grey, slightly moist. Mottled light greyish brown and orange, moist.														116kPa (U) 42kPa (R)	
		Moderately to highly plastic.								OB	100						
		Highly plastic.															102kPa (U) 59kPa (R)
		Minor fine sand, mottled orange and light grey.								OB	80						
2.00		Trace fine sand.															91kPa (U) 52kPa (R)
										OB	80						
2.90																	
3.00		CLAY, some silt, minor fine sand, stiff, highly plastic, mid-grey with black flecks, very moist, trace organics.												60kPa (U) 22kPa (R)			
3.25		CLAY, minor fine sand, minor silt, stiff, moderately plastic, light grey, moist.				T1	TU	100									
3.55																	
3.70		CLAY, minor fine sand, minor silt, stiff, highly plastic, light brown with black mottles, moist, organics.															
		CLAY, minor fine sand, minor silt, stiff, moderately plastic, light grey, moist.															
3.95																	
4.00		SAND, fine to medium, clayey, slightly plastic, light grey, moist.					OB	100									
4.25																	
		SAND, fine to medium, some silt, non-plastic, light grey, moist.  Dark grey, very moist. Wet.												5/5/2 N = 7			
4.90						S1	SPT	100	7								
5.00		ORGANIC CLAY, minor fine sand, minor silt,					WD	0									

Remarks:



# SUMMARY OF SOIL PROFILE & TESTING

JOB No.

42608/GE

PROJECT:

WEST COAST ROAD, HENDERSON

HOLE No.

BH2

DATE STARTED: 18/07/2006

METHOD: OB/SPT/TU/WD

RIG: track mounted excavator rig

SHEET 2 of 2

DATE FINISHED: 18/07/2006

DRILLED BY: Prodrill (Auck) Ltd.


FLUID: water

LOGGED BY: J. Franklin / H. Singh


DEPTH (m)		SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS												
		SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +  IN SITU VANE (kPa) = ✱						OTHER TESTS	
																	Corrected Shear Vane Result **	
																	U = peak / R = remoulded	
		SPT / Scala Penetrometer																
5.25		abundant organics, highly plastic, dark brownish grey, moist.	PUKETOKA FORMATION (TAURANGA FORMATION)			T2	TU	100			X	●		+				
6.00		CLAY, minor silt, trace fine sand, stiff to very stiff, moderately plastic, light grey with occasional black mottles, moist.					OB	100							✱	162kPa (U) 48kPa (R)		
		Moderately to highly plastic.																
		Highly plastic, very moist.											✱			78kPa (U) 24kPa (R)		
7.00		Moist.				T3	TU	100										
8.00		Minor fine sand, moderately plastic. Pocket of fine sandy clay.	WAITEMATA GROUP SOIL															
		CLAY, fine sandy, minor silt, very stiff, moderately plastic, light grey with occasional green mottles, slightly moist.				S2	SPT	100	10			✱	●			81kPa (U) 24kPa (R) 4/5/5 N = 10		
		Mid-grey with white speckles.																
9.00		Fine to medium sandy, grades to dark grey.					OB	81						✱		167kPa (U) 42kPa (R)		
		10cm fine gravelly horizon (siltstone gravel) and carbonaceous material.																
9.95							S3	SPT	100	18		●				unable to penetrate 7/8/10 N = 18		

End of Borehole at 9.95 m

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING				JOB No.	42608/GE							
PROJECT:		WEST COAST ROAD, HENDERSON				HOLE No.	BH1							
DATE STARTED: 18/07/2008		METHOD: OB/SPT/TU		RIG: track mounted excavator rig		SHEET 1 of 3								
DATE FINISHED: 18/07/2008		DRILLED BY: Prodrill (Auck) Ltd.		FLUID: water		LOGGED BY: J. Franklin / H. Singh								
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS	
										LIMITS: PLASTIC = X	LIQUID = +		Corrected Shear Vane Result **	
										20	40	60	U = peak / R = remoulded	
										IN SITU VANE (kPa) = *			SPT / Scala Penetrometer	
										50	100	150		
0.15	TOPSOIL.		TS											
	SILT, clayey, minor fine sand, stiff, moderately plastic, dark grey, moist.			NR		OB	80							66kPa (U) 18kPa (R)
0.85						OB	90			*				
1.00	CLAY, minor silt, minor fine sand, firm to stiff, moderately plastic, mottled orange and light grey, moist.					OB	100			*	*			91kPa (U) 52kPa (R)
	Highly plastic, brown with orange mottles, very moist, fine to medium sand-sized organics.									*				52kPa (U) 26kPa (R)
2.00					T1	TU	100			X	●		+	
2.05	Roots and organics.													
	CLAY, minor fine sand, stiff, highly plastic, light bluish grey, moist.					OB	100			*				48kPa (U) 7kPa (R)
	Occasional bright orange mottles and white specks, occasional siltstone gravel.													
	Root.									*				48kPa (U) 17kPa (R)
3.00	Becomes firm.									*	*			
					T2	TU	100			*		●	10	
	Trace fine sand.													
4.00						OB	100			*				60kPa (U) 27kPa (R)
	Occasional faint black mottles.									*				
										*				45kPa (U) 18kPa (R) 1/2/3 N = 5
5.00						S1	SPT	100	5			●		

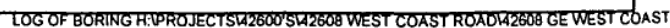
Remarks:

		<b>SUMMARY OF SOIL PROFILE &amp; TESTING</b>				JOB No. <b>42608/GE</b>	
		PROJECT: <b>WEST COAST ROAD, HENDERSON</b>				HOLE No. <b>BH1</b>	
DATE STARTED: 18/07/2006		METHOD: OB/SPT/TU		RIG: track mounted excavator rig		SHEET 2 of 3	
DATE FINISHED: 18/07/2006		DRILLED BY: Prodrill (Auck) Ltd.		FLUID: water		LOGGED BY: J. Franklin / H. Singh	

DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS	
										LIMITS: PLASTIC = X      LIQUID = +		Corrected Shear Vane Result **		
										20	40			60
										IN SITU VANE (kPa) = ✱			U = peak / R = remoulded  SPT / Scala Penetrometer	
										50	100	150		
6.00		Grades to mid-grey with black specks, some fine sand.				OB	100			✱				42kPa (U) 11kPa (R)
6.25		CLAY, some fine sand, minor silt, stiff becoming very stiff, moderately to highly plastic, light grey to mid-grey, moist.				T3	TU	100		✱				70kPa (U) 18kPa (R)
7.00		Silty patches, mid-grey.				OB	100			✱				70kPa (U) 24kPa (R)
8.00														134kPa (U) 31kPa (R) 5/6/7 N = 13
8.05		Band of fine sandy CLAY with some fine siltstone gravel.				S2	SPT	100	13		●			
8.15		CLAY, some fine sand, minor silt, very stiff, moderately to highly plastic, light grey to mid-grey, moist.				OB	90							
9.00		Very stiff to hard, with white flecks.												unable to penetrate 6/7/9 N = 16
9.60		CLAY, fine sandy, some silt, trace siltstone gravel, hard, moderately plastic, dark grey, slightly moist, with pockets of fine sand.				S3	SPT	100	16		●			
10.00						OB	100							

Remarks:



## EXPLANATION OF TERMS AND SYMBOLS
















These pages present an explanation of the terms and symbols used on the log sheets entitled "Summary of Soil Profile and Testing". The materials, boundaries and conditions have been interpreted at the test hole locations only and could differ elsewhere on the site.

### 1. DEPTH / ELEVATION

This column refers to the depth below the ground surface existing at the time of drilling. The corresponding elevations are shown with respect to the datum noted where survey information is available.

### 2. SOIL AND ROCK SYMBOL

This column contains the standard soil and rock symbols used by Babbage for the materials encountered in the boreholes as shown below:

	Fill		Clay		Boulders
	Asphalt		Silt		Sandstone
	Concrete		Sand		Siltstone
	Topsoil		Gravel		Volcanic Rock
	Peat or Organic Soil		Cobbles		Uncertain Material

### 3. SOIL AND ROCK DESCRIPTION

The terms used to describe the soils and rocks are generally in accordance with the NZ Geomechanics Society's "*Guidelines for the Field Description of Soils and Rocks in Engineering Use*", Nov. 1988 and the NZ Geotechnical Society's "*Guidelines for the Classification and Field Description of Soils and Rocks for Engineering Purposes*" Feb 2003 (draft for comment).

The **soils** are generally described in the following order:

Major soil type, minor soil type/s, consistency (for cohesive soils) or density (for cohesionless soils), plasticity, structure and/or particle shapes, colour, moisture condition, minor inclusions, other significant aspects (e.g. geological description).

Where rock is encountered, the **rock material** and the **rock mass** are described in the following order:

Major rock type, texture and fabric, strength, weathering, colour, discontinuity type, discontinuity spacing, discontinuity orientation, discontinuity opening, discontinuity roughness, geological description (if this can be determined).

Where no field or laboratory tests are carried out, the soils and rock descriptions are based on handling and visual assessment of the recovered samples. Any design based on such descriptions should allow for the generic nature of the descriptions.

### 4. GEOLOGIC UNIT

This column divides the soil and/or rock encountered in the borehole into units that have been formally described and published by geologists (determined from geological maps), or informal units describing what general categories the materials belong to eg. fill, weathered rock, alluvium, etc.




## EXPLANATION OF TERMS AND SYMBOLS

### 5. PIEZOMETER

This column graphically displays what happens to the hole on completion of drilling – ie. whether the hole is backfilled, left open with a plug, or if a piezometer/standpipe is installed. Details of the installation are given in the "Remarks" section at the bottom of the log.

### 6. GROUNDWATER

The groundwater level, or the depth at which free water was observed in the borehole, or any seepage observed in the borehole, are denoted by the symbols given below.

 water level at time of drilling       water level at a later date       observed seepage

The level is the water level in an open hole unless otherwise indicated.

**N** in the column indicates the water level could not be recorded due to drilling water/mud, rain or hole caving.

**NR** in this column indicates that no record of the groundwater level was taken.





**D** in this column indicates that the hole was dry.



**F** in this column indicates when free water in the hole was first noticed. ...

### 7. SOIL SAMPLES

#### Condition

This column indicates the depth, length and condition of each sample taken. The following symbols are used to represent the condition of the samples.

 undisturbed       disturbed/remoulded       sample / solid nose SPT test       standard penetration

 no recovery       rock core

#### Type (and sample number)

The type of sample and its sequential number is indicated in this column as follows:

<b>A</b>	auger sample	<b>P</b>	piston tube sample
<b>B</b>	block or bulk sample	<b>S</b>	standard penetration test (SPT) sample
<b>D</b>	disturbed sample (eg. open barrel core)	<b>T</b>	thin-walled tube sample
<b>J</b>	jar sample	<b>W</b>	wash or air return sample
<b>GW</b>	ground water sample	<b>O</b>	other (see text)

Disturbed soils samples are transported and stored in plastic bags. Machine borehole disturbed samples are transported and stored in core boxes. Tube samples are sealed with plastic bags in the field and with wax on return to the laboratory.

#### Method

This refers to the particular drilling/sampling technique:

<b>HA</b>	hand auger	<b>TU</b>	push-tube
<b>HD</b>	hand dug	<b>SSA</b>	solid stem machine auger
<b>HSA</b>	hollow stem machine auger	<b>SPT</b>	standard penetration test
<b>EX</b>	hydraulic excavator	<b>SP</b>	scala penetrometer
<b>OB</b>	open barrel	<b>TT</b>	triple tube
<b>PP</b>	pneumatic percussion	<b>WD</b>	wash drill

## EXPLANATION OF TERMS AND SYMBOLS

### Recovery

This column gives the sample recovery as a percentage of the sampled length for open barrel and triple tube core runs, and also split spoon SPT tests. If nothing is shown, the sample recovery was not measured.

## 8. TEST RESULTS

### Penetration Resistance

The Penetration Resistance is the number of blows required to drive either a 50mm (outside diameter) open end "spilt spoon" or "Raymond" sampler the final 300mm of a 450mm penetration using a 64kg weight falling 760mm. The number of blows required to drive the sampler the final 300mm is referred to as the "**N**" value. The test is referred to as the **Standard Penetration Test or SPT**. The number of blows for each 150mm penetration of the test, or part-penetration when driving is terminated due to hard ground, are given in the "Other Tests" column, e.g. 15, 36, 46 for 55mm would indicate 15 blows for the first 150mm, 36 blows for the second 150mm and 46 blows for a further 55mm penetration and a N value of greater than 50 would be reported.

In some cases a solid steel 60° cone is used for this test (a **solid nose Standard Penetration Test**). For these cases the penetration resistance is reported as an "**S**" value is reported in this column.

### Water Content and Atterberg Limits

The moisture or water content, plastic limit and liquid limit of the recovered soil sample, as determined in the laboratory in accordance with the test procedures set out in NZS4402, is plotted against depth. The abbreviations and graphic symbols are defined as follows:

•	w	natural moisture content
×	w <sub>p</sub>	plastic limit
+	w <sub>L</sub>	liquid limit

### Other Tests

The following abbreviations are used to indicate the type of test undertaken:

COM	Compaction Test	pp	Pocket penetrometer strength
*CON	Consolidation test	*Q	Consolidated undrained triaxial test
G	Specific gravity or solid density of particles	qu	Unconfined compressive strength
k	Permeability coefficient	*SB	Shear box test
LS	Linear shrinkage	SP	Scala penetrometer
OC	Organic content	*ST	Swelling test
*PSD	Particle size distribution	SV	Vane shear strength: (U) – undisturbed (R) – remoulded

\*These tests are usually summarised separately.

## 9. REMARKS

Any additional observations or relevant information such as weather conditions, piezometer design, daily drilling progress, survey co-ordinates of the borehole, problems encountered during drilling, etc.

**Appendix C**  
**Laboratory Testing**



Babbage Geotechnical Laboratory  
109 Fanshawe Street  
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Auckland  
Telephone  
Fax  
Email

P O Box 2027  
New Zealand  
64-9-367 4954  
64-9-377 0554  
[wec@babbage.co.nz](mailto:wec@babbage.co.nz)

Please reply to: W.E. Campton

Page 1 of 2

Babbage Consultants Limited  
P O Box 2027  
Auckland 1140, New Zealand

Job Number: 42608/GE/L

File:

Checked by: J.F.

JF

28<sup>th</sup> July 2006

Attention: RUSSELL ALLISON

Dear Sir,

Re: West Coast Road, Henderson  
SPT Moisture Content Testing  
Report No. 42608/GE/L/SPT Moistures

The following table presents the results of moisture content testing on drill rig Standard Penetration Test (SPT) soil samples collected by this laboratory on the 18<sup>th</sup>, 19<sup>th</sup> and 25<sup>th</sup> of July 2006. Test Standards used are as follows:

Moisture Content NZS4402:1986:Test 2.1

Hole No	Sample No	Depth (m)	Moisture Content (%)
BH1	S1	4.50 – 4.95	61.8
	S2	7.50 – 7.95	37.4
	S3	9.00 – 9.45	34.6
	S4	10.50 – 10.95	33.4
BH2	S1	4.50 – 4.95	44.0
	S2	8.00 – 8.45	45.9
	S3	9.50 – 9.95	33.3
BH3	S1	1.50 – 1.95	72.8
	S2	3.00 – 3.45	76.4
	S3	4.50 – 4.95	42.6
	S4	6.00 – 6.45	38.1
BH4	S1	2.00 – 2.45	37.2
	S2	3.50 – 3.95	61.8
	S3	5.00 – 5.45	67.5
	S4	7.50 – 7.95	94.1
	S5	10.50 – 10.95	46.1
	S6	12.00 – 12.45	38.8

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the undersigned at your convenience.



Job No: 42608/GE/L

28<sup>th</sup> July 2006

Page 2 of 2

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Wayne Campton', is written over the printed name.

Wayne Campton  
Signatory (Laboratory Manager)  
Babbage Geotechnical Laboratory



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.



Babbage Geotechnical Laboratory  
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P O Box 2027  
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64-9-367 4954  
64-9-377 0554  
[wec@babbage.co.nz](mailto:wec@babbage.co.nz)

Please reply to: W.E. Campton

Page 1 of 2

Babbage Consultants Limited  
P O Box 2027  
Auckland 1140, New Zealand

Job Number: 42608/GE/L

File:

Checked by:

JF

7<sup>th</sup> August 2006

Attention: **RUSSELL ALLISON**

Dear Sir,

Re: **West Coast Road  
Plasticity Testing  
Report No. 42608/GE/L/AL**

The following table presents the results of Atterberg Limits testing on soil push-tube samples collected by this laboratory on the 18<sup>th</sup> of July 2006. Our instructions were to determine the natural moisture content and plasticity index of these samples. Page two of this report shows where these samples plot on the Casagrande Chart.

Test standards used were:

Moisture Content: NZS4402:1986:Test 2.1  
Liquid Limit: NZS4402:1986:Test 2.2

Plastic Limit: NZS4402:1986:Test 2.3  
Plasticity Index: NZS4402:1986:Test 2.4

Sample Number	Depth (m)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
BH1 T1	1.50 – 1.95	39.0	78	25	53
BH1 T2	3.00 – 3.45	60.4	110	30	80
BH2 T2	5.00 – 5.45	42.4	68	22	46

Note: The whole soil was used for these tests and was wet up & dried where required.  
The test results relate only to the samples under test due to the sampling procedure.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the undersigned at your convenience.

Yours faithfully,

Wayne Campton  
Signatory (Laboratory Manager)  
Babbage Geotechnical Laboratory



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

## PROJECT:

WEST COAST ROAD, HENDERSON

Determination of the Liquid Limit, Plastic Limit, and  
the Plasticity Index

Test Method: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

Tested By:

JF

4/08/06

Compiled By:

JF

7/08/06

Checked By:

JF

7/08/06

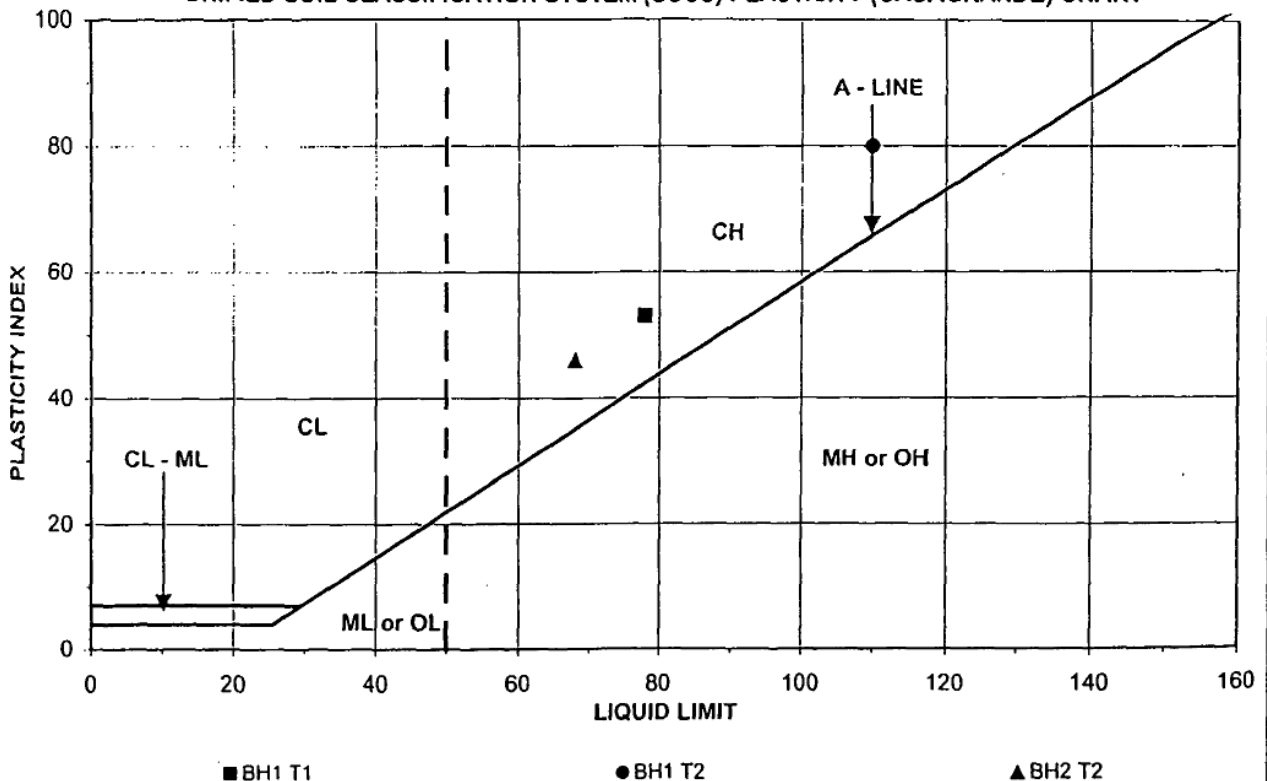
Initials

Date

## SUMMARY OF TESTING

SAMPLE NUMBER	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification
BH1 T1 / 1.50 - 1.95m	78	25	53	CH
BH1 T2 / 3.00 - 3.45m	110	30	80	CH
BH2 T2 / 5.00 - 5.45m	68	22	46	CH

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) PLASTICITY (CASAGRANDE) CHART



## LEGEND

CL Clay - low plasticity

ML Silt - low liquid limit

OL Organic Soil - low liquid limit

CH Clay - high plasticity

MH Silt - high liquid limit

OH Organic Soil - high liquid limit

NOTE: soil type descriptions are based on recommendations in the NZGS "Field Description of Soils &amp; Rocks" (Draft for comment Feb 2003).



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Please reply to: W.E. Campton

Page 1 of 10

Babbage Consultants Limited  
P O Box 2027  
Auckland 1140, New Zealand

Job Number: 42608/GE/L

Attention: RUSSELL ALLISON

Checked by:   
JF  
23<sup>rd</sup> August 2006

Dear Sir,

Re: *West Coast Road*  
*One Dimensional Consolidation Testing*  
*Report Number: 42608/GE/L/ODC*

The following ten pages presents a summary of the results of one dimensional consolidation testing on 75mm and 60mm diameter push-tube samples collected by this laboratory on the 18<sup>th</sup> of July 2006. These push-tube samples were tested in accordance with the following standards:

Moisture Content:	NZS4402:1986:Test 2.1
One Dimensional Consolidation:	NZS4402:1986:Test 7.1

Samples were extruded from the tube and then trimmed close to final ring diameter using a scalpel blade. The consolidation ring was then pushed over the trimmed soil until the sample protruded from both ends of the ring. A wire was then used to cut the sample from the remaining tube and a flat edge used to trim the soil in the ring.

These test results relate to the samples tested only. The values of  $M_v$  shown on the tables have been calculated for each pressure increment, using void ratio difference for that increment.

#### Sample Descriptions :

##### **BH1 T1 / 1.50 – 1.95m**

CLAY, trace fine sand, trace silt, firm to stiff, highly plastic, light grey with orange & black mottles, very moist, rootlets.

##### **BH1 T2 / 3.00 – 3.45m**

CLAY, trace fine sand, trace silt, firm, highly plastic, light grey, very moist.

##### **BH2 T2 / 5.00 – 5.45m**

CLAY, minor fine sand, minor silt, very stiff, highly plastic, light grey, slightly moist.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the undersigned at your convenience.

Yours faithfully,



Wayne Campton  
Signatory (Laboratory Manager)  
Babbage Geotechnical Laboratory



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

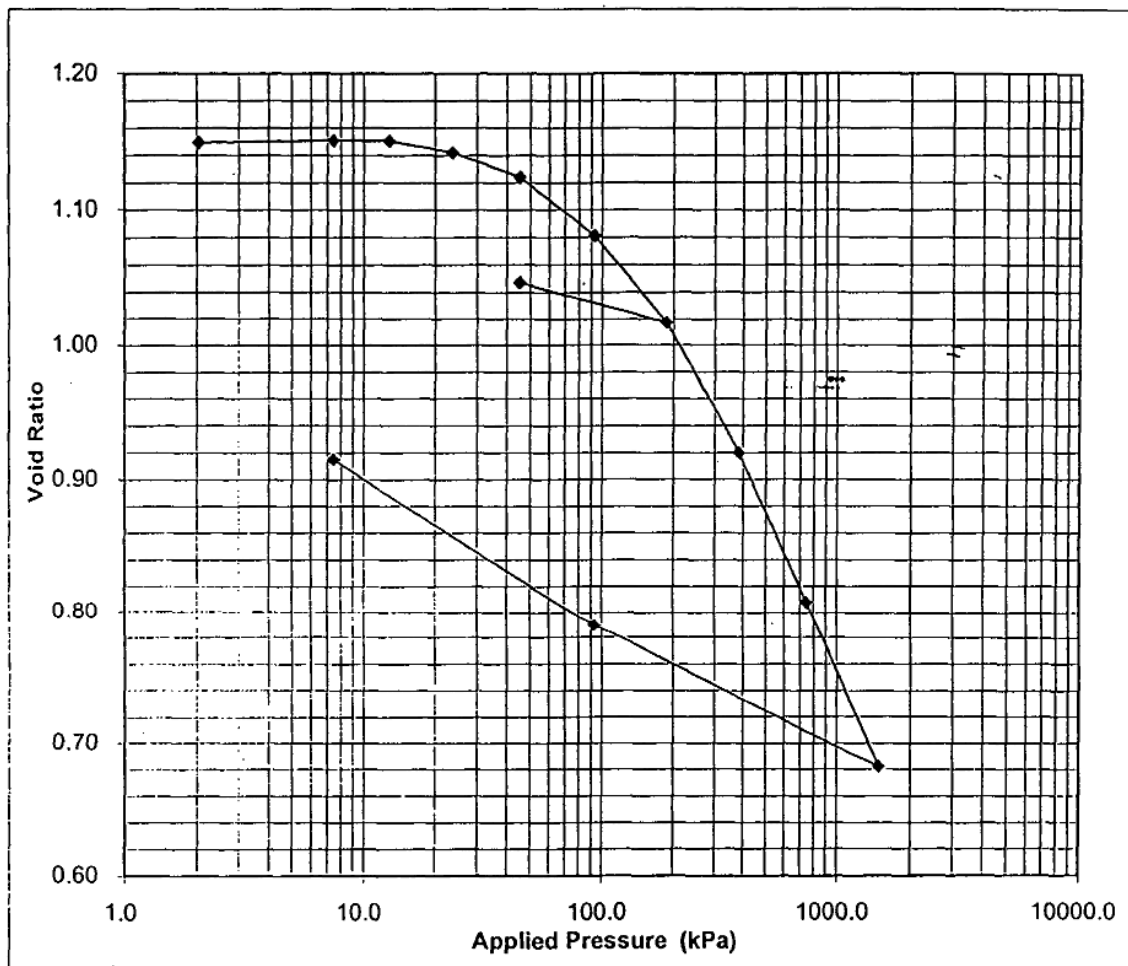


Job No: 42608/GE/L	Reg. No: 1503	Sheet 2	of 10	Issue Date: Aug-99
PROJECT WEST COAST ROAD				Rev. No: 4
				Auth. By: WEC
				Initials Date
ONE DIMENSIONAL CONSOLIDATION				Tested By: JF
Test Method: NZS4402:1986:Test 7.1				Compiled By: JF
				Checked By: WEC
				23/08/06

Bore No: BH1

Sample Number: T1

Depth: 1.5 - 2.0m



Applied Pressure kPa	Void Ratio e <sub>v</sub>	Mv m/MN	Consolidation Coefficient	
			Cv (log t) m/year	Cv (sq t t) m/year
2.0	1.149			
7.5	1.151	-0.127		
12.9	1.151	0.024		
23.7	1.142	0.369	1.9	9.9
45.4	1.124	0.391	1.3	2.7
93.1	1.081	0.421	1.4	3.6
186.3	1.017	0.329	1.1	2.1
45.4	1.047	0.104		
186.3	1.018	0.102		
383.6	0.920	0.245	1.0	1.3
747.7	0.808	0.160	0.9	1.0
1493.5	0.682	0.093	0.8	1.1
93.1	0.790	0.046		
7.5	0.915	0.818		

**B G L**BABBAGE  
GEOTECHNICAL  
LABORATORYJob No:  
42608/GE/LReg. No:  
1503Sheet of  
3 10Issue Date:  
Rev. No:Aug-99  
4

PROJECT

WEST COAST ROAD

Auth. By:

WEC

Initials

Date

**ONE DIMENSIONAL CONSOLIDATION**

Test Method: NZS4402:1986:Test 7.1

Tested By:

JF

Jul-06

Compiled By:

JF

Jul-06

Checked By:

WEC

23/08/06

**RESULT SUMMARY:**

Bore Number: BH1

Sample Number: T1

Depth: 1.5 - 2.0m

Sample History:

Undisturbed / remoulded / compacted / other

Specimen from 75mm diameter tube

Compacted with ..... compactive effort / other

Sample preparation:

Extruded from 75mm diameter tube in increments and trimmed around ring.  
60mm diameter ring then pushed over sample.

Test details:

Consolidation machine number : 2

Ring number : Brass

Area of ring : 2827mm<sup>2</sup>Solid density of soil particles,  $P_s = 2.65 \text{ t/m}^3$  : measured/assumed

		INITIAL		FINAL	
Mass of dry specimen	$M_s$ (g)		72.50		72.50
Thickness of specimen	$H$ (mm)	$H_i$	20.800	$H_f$	16.278
Water content	$w$ (%)	$w_i$	42.8	$w_f$	36.5
Dry density	$t/m^3$	$P_{d_i}$	1.23	$P_{d_f}$	1.58
$P_d = \frac{M_s}{H \times A}$					
Height of Soil Particles	mm	$H_s$	9.677	$H_s$	9.677
$H_s = \frac{M_s \times 1000}{P_s \times A}$					
Void Ratio		$e_i$	1.149	$e_f$	0.682
$e = \frac{H - H_s}{H_s}$					
Degree of Saturation	%	$S_i$	98.6	$S_f$	142
$S = \frac{P_s \times w}{e}$					

# B G L

BABBAGE  
GEOTECHNICAL  
LABORATORY

Job No:	Reg. No:	Sheet of	Issue Date:	Aug-99
42608/GE/L	1503	4 10	Rev. No:	4
PROJECT			Auth. By:	WEC
WEST COAST ROAD				
			Initials	Date

## ONE DIMENSIONAL CONSOLIDATION

Test Method: NZS4402:1986:Test 7.1

Tested By:	JF	Jul-06
Compiled By:	JF	Jul-06
Checked By:	WEC	23/08/06

Bore No: BH1

Sample Number: T1

Depth: 1.5 - 2.0m

Applied Pressure	Incremental Deflection	Thickness of Specimen	Comp Ratio	Height of Voids	Voids Ratio	Coefficient of Consolidation	
kPa	mm	mm		mm	e	(log t) m <sup>2</sup> /year	(sqrt t) m <sup>2</sup> /year
2.0	0.000	20.800	1.000	11.123	1.149		
7.5	-0.014	20.814	1.001	11.138	1.151		
12.9	0.003	20.812	1.001	11.135	1.151		
23.7	0.083	20.728	0.997	11.052	1.142	1.94	9.93
45.4	0.176	20.553	0.988	10.876	1.124	1.35	2.70
93.1	0.412	20.140	0.968	10.464	1.081	1.37	3.62
186.3	0.618	19.523	0.939	9.846	1.017	1.05	2.13
45.4	-0.286	19.809	0.952	10.132	1.047		
186.3	0.286	19.523	0.939	9.846	1.018		
383.6	0.944	18.579	0.893	8.903	0.920	0.99	1.33
747.7	1.084	17.495	0.841	7.818	0.808	0.88	1.00
1493.5	1.217	16.278	0.783	6.602	0.682	0.78	1.08
93.1	-1.040	17.318	0.833	7.641	0.790		
7.5	-1.213	18.531	0.891	8.854	0.915		

Overburden Pressure  $P_o$  kpa

Pressure  $P_i$   $P_o + 100$  kPa

Thickness at  $P_o$   $H_o$  mm

Thickness at  $P_i$   $H_i$  mm

Voids Ratio at  $P_o$   $e_o$

Voids Ratio at  $P_i$   $e_i$

Coefficient of Compressibility  $M_v$  m<sup>2</sup>/MN

$$\frac{(e_o - e_i) \cdot 1000}{(1 + e_o)(P_i - P_o)}$$

# BGL

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LABORATORY

Job No:	Reg. No:	Sheet	of	Issue Date:	Aug-99
42608/GE/L	1503	5	10	Rev. No:	4
PROJECT				Auth. By:	WEC
WEST COAST ROAD					
				Initials	Date

## ONE DIMENSIONAL CONSOLIDATION

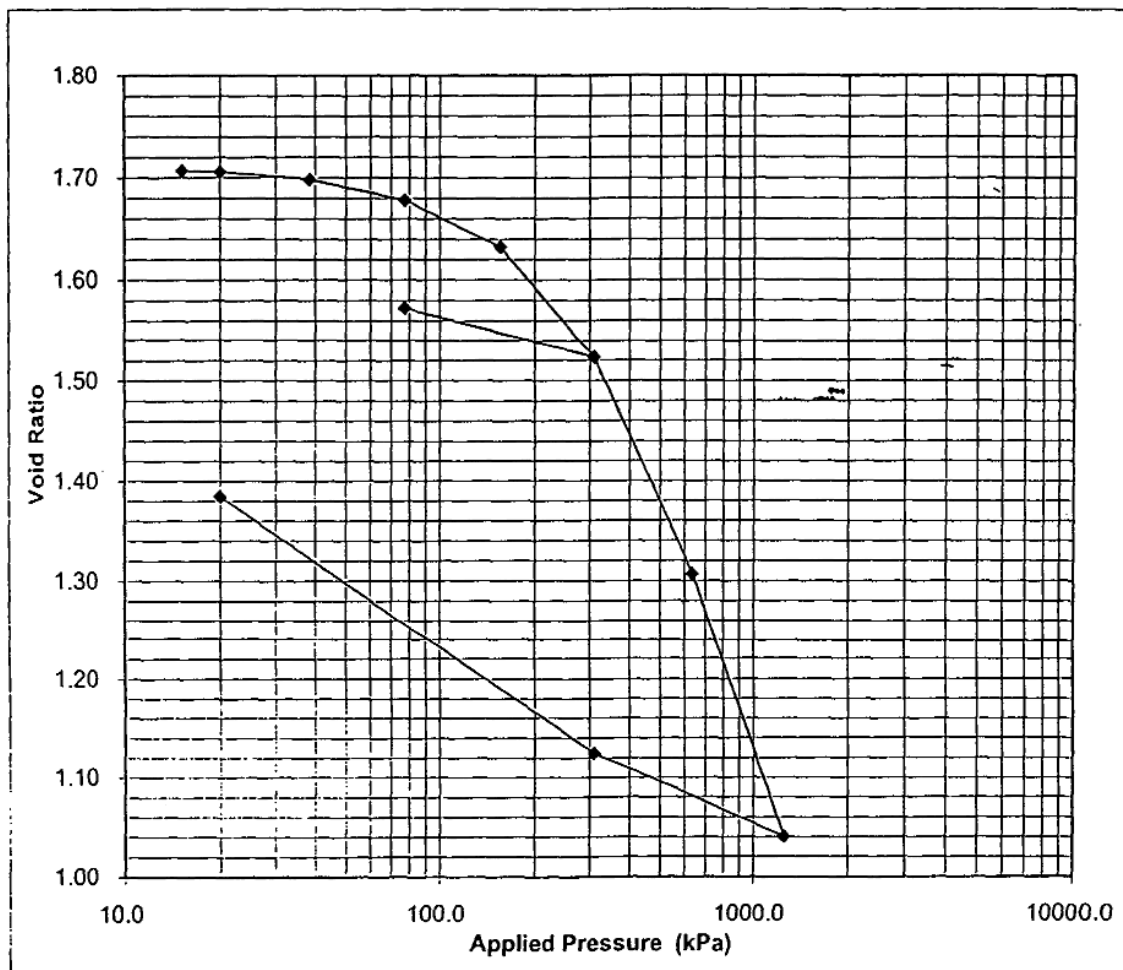
Test Method: NZS4402:1986:Test 7.1

Tested By:	JF	Jul-06
Compiled By:	JF	Jul-06
Checked By:	WEC	23/08/06

Bore No: BH1

Sample Number: T2

Depth: 3.0-3.5m



Applied Pressure kPa	Void Ratio e	MV m/MN	Consolidation Coefficient	
			Cv (log t) m/year	Cv (sq t) m/year
15.1	1.707			
20.0	1.706	0.060		
38.4	1.698	0.156	3.6	6.4
77.3	1.678	0.190	2.7	4.4
154.9	1.632	0.221	2.9	3.5
310.2	1.523	0.267	1.3	1.6
77.3	1.573	0.084		
310.2	1.523	0.083		
636.4	1.307	0.263	1.2	1.2
1257.7	1.040	0.186	1.0	1.0
310.2	1.125	0.044		
20.0	1.385	0.422		

BGL

BARRAGE  
GEOTECHNICAL  
LABORATORY

Job No: 42608/GE/L	Reg. No: 1503	Sheet of 6 10	Issue Date: Aug-99
PROJECT WEST COAST ROAD			Rev. No: 4
			Auth. By: WEC
			Initials Date
ONE DIMENSIONAL CONSOLIDATION			Tested By: JF Jul-06
Test Method: NZS4402:1986:Test 7.1			Compiled By: JF Jul-06
			Checked By: WEC 23/08/06

## RESULT SUMMARY:

Bore Number: BH1 Sample Number: T2 Depth: 3.0-3.5m

Sample History: Undisturbed / ~~remoulded~~ / ~~compacted~~ / other  
 Specimen from 75mm diameter tube  
 Compacted with ..... compactive effort / other

Sample preparation: Extruded from 75mm diameter tube in increments and trimmed around ring.  
 63.4mm diameter ring then pushed over sample.

Test details: Consolidation machine number : 7 Ring number : Silver  
 Area of ring : 3157mm<sup>2</sup>  
 Solid density of soil particles, Ps = 2.65 t/m<sup>3</sup> : ~~measured~~/assumed

		INITIAL	FINAL
Mass of dry specimen	Ms (g)	70.46	70.46
Thickness of specimen	H (mm)	Hi 22.800	Hf 17.186
Water content	w (%)	w <sub>i</sub> 68.3	w <sub>f</sub> 53.6
Dry density	t/m <sup>3</sup>	Pd <sub>i</sub> 0.98	Pd <sub>f</sub> 1.30
$P_d = \frac{M_s}{H \times A}$			
Height of Soil Particles	mm	Hs 8.423	Hs 8.423
$H_s = \frac{M_s \times 1000}{P_s \times A}$			
Void Ratio		e <sub>i</sub> 1.707	e <sub>f</sub> 1.040
$e = \frac{H - H_s}{H_s}$			
Degree of Saturation	%	Si 106.0	Sf 137
$S = \frac{P_s \times w}{e}$			

# B G L

BABBAGE  
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LABORATORY

Job No: 42608/GE/L	Reg. No: 1503	Sheet of 7 10	Issue Date: Aug-99
PROJECT WEST COAST ROAD			Rev. No: 4
			Auth. By: WEC
			Initials Date
ONE DIMENSIONAL CONSOLIDATION		Tested By: JF	Jul-06
Test Method: NZS4402:1986:Test 7.1		Compiled By: JF	Jul-06
		Checked By: WEC	23/08/06

Bore No: BH1 Sample Number: T2 Depth: 3.0-3.5m

Applied Pressure	Incremental Deflection	Thickness of Specimen	Comp. Ratio	Height of Voids	Voids Ratio	Coefficient of Consolidation	
kPa	mm	mm		mm	e	(log t) m <sup>2</sup> /year	(sqrt t) m <sup>2</sup> /year
15.1	0.000	22.800	1.000	14.377	1.707		
20.0	0.007	22.793	1.000	14.371	1.706		
38.4	0.066	22.728	0.997	14.305	1.698	3.55	6.41
77.3	0.167	22.560	0.989	14.138	1.678	2.69	4.42
154.9	0.388	22.172	0.972	13.750	1.632	2.94	3.53
310.2	0.920	21.252	0.932	12.830	1.523	1.28	1.62
77.3	-0.417	21.669	0.950	13.246	1.573		
310.2	0.417	21.252	0.932	12.830	1.523		
636.4	1.820	19.432	0.852	11.010	1.307	1.17	1.15
1257.7	2.246	17.186	0.754	8.763	1.040	0.98	0.96
310.2	-0.711	17.897	0.785	9.475	1.125		
20.0	-2.192	20.089	0.881	11.666	1.385		

Overburden Pressure  $P_o$  kpa  
 Pressure  $P_i$   $P_o + 100$  kPa  
 Thickness at  $P_o$   $H_o$  mm  
 Thickness at  $P_i$   $H_i$  mm  
 Voids Ratio at  $P_o$   $e_o$   
 Voids Ratio at  $P_i$   $e_i$

Coefficient of Compressibility  $M_v$  m<sup>2</sup>/MN

$$\frac{(e_o - e_i) \cdot 1000}{(1 + e_o)(P_i - P_o)}$$



Job No:	Reg. No:	Sheet	of	Issue Date:	Aug-99
42608/GE/L	1503	8	10	Rev. No:	4
PROJECT				Auth. By:	WEC
WEST COAST ROAD				Initials	Date

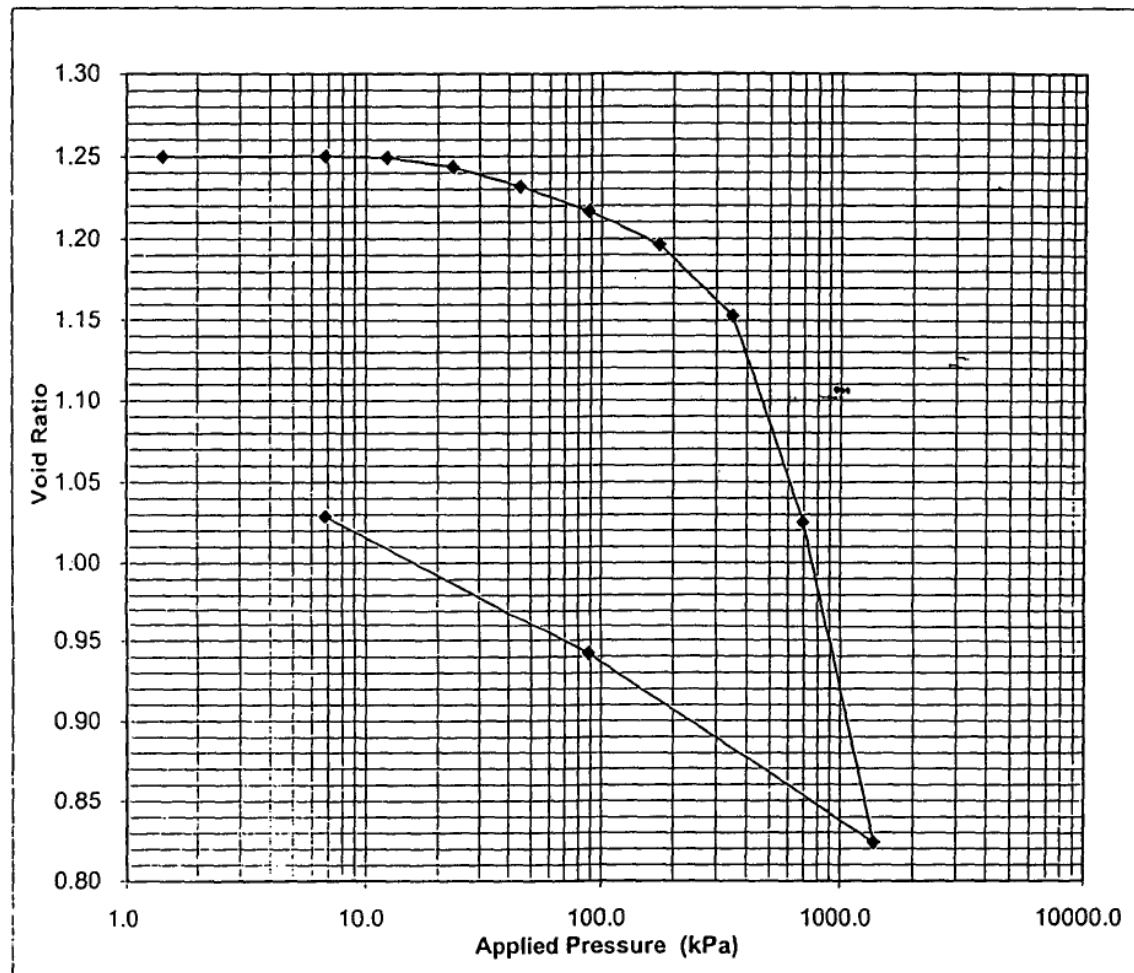
ONE DIMENSIONAL CONSOLIDATION  
Test Method: NZS4402:1986:Test 7.1

Tested By:	JF	Aug-06
Compiled By:	JF	Aug-06
Checked By:	WEC	23/08/06

Bore No: BH2

Sample Number: T2

Depth: 5.0 - 5.5m



Applied Pressure kPa	Void Ratio	MV m <sup>3</sup> /MN	Consolidation Coefficient	
			C <sub>v</sub> (log t) m <sup>2</sup> /year	C <sub>v</sub> (sqrt t) m <sup>2</sup> /year
1.4	1.250			
6.8	1.250	0.000		
12.3	1.249	0.094	18.1	48.2
23.1	1.244	0.222	18.0	30.8
44.8	1.232	0.246	18.0	30.7
88.1	1.217	0.156	16.0	26.7
174.8	1.196	0.105	17.5	34.4
348.3	1.153	0.114	11.9	20.4
695.1	1.025	0.171	2.5	6.6
1388.8	0.824	0.143	1.1	2.2
88.1	0.942	0.050		
6.8	1.029	0.550		

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Job No: 42608/GE/L	Reg. No: 1503	Sheet of 9 10	Issue Date: Aug-99
PROJECT WEST COAST ROAD			Rev. No: 4
			Auth. By: WEC
			Initials Date
ONE DIMENSIONAL CONSOLIDATION Test Method: NZS4402:1986:Test 7.1		Tested By: JF	Aug-06
		Compiled By: JF	1 Aug-06
		Checked By: WEC	23/08/06

**RESULT SUMMARY:**

Bore Number: BH2                      Sample Number: T2                      Depth: 5.0 - 5.5m

Sample History:                      Undisturbed / ~~remoulded~~ / ~~compacted~~ / ~~other~~  
    Specimen from 60mm diameter tube  
    Compacted with ..... compactive effort / other

Sample preparation:                      Extruded from 60mm diameter tube directly into ring, ends of sample then  
    trimmed flat with edge of ring using a straight edge.

Test details:                      Consolidation machine number : 1                      Ring number : Silver  
    Area of ring : 2827mm<sup>2</sup>  
    Solid density of soil particles, Ps = 2.65t/m<sup>3</sup> : ~~measured~~/assumed

		INITIAL		FINAL	
Mass of dry specimen	Ms (g)		83.26		83.26
Thickness of specimen	H (mm)	Hi	25.000	Hf	20.269
Water content	w (%)	w <sub>i</sub>	48.1	w <sub>f</sub>	41.9
Dry density	t/m <sup>3</sup>	Pd <sub>i</sub>	1.18	Pd <sub>f</sub>	1.45
$P_d = \frac{M_s}{H \times A}$					
Height of Soil Particles	mm	Hs	11.112	Hs	11.112
$H_s = \frac{M_s \times 1000}{P_s \times A}$					
Void Ratio		e <sub>i</sub>	1.250	e <sub>f</sub>	0.824
$e = \frac{H - H_s}{H_s}$					
Degree of Saturation	%	Si	102.0	Sf	135
$S = \frac{P_s \times w}{e}$					

# B G L

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GEOTECHNICAL  
LABORATORY

Job No: 42608/GE/L	Reg. No: 1503	Sheet of 10 10	Issue Date: Aug-99
PROJECT WEST COAST ROAD			Rev. No: 4
			Auth. By: WEC
			Initials Date

ONE DIMENSIONAL CONSOLIDATION  
Test Method: NZS4402:1986:Test 7.1

Tested By:	JF	Aug-06
Compiled By:	JF	Aug-06
Checked By:	WEC	23/08/06

Bore No: BH2

Sample Number: T2

Depth: 5.0 - 5.5m

Applied Pressure kPa	Incremental Deflection mm	Thickness of Specimen mm	Comp Ratio	Height of Voids mm	Void Ratio e	Coefficient of Consolidation	
						(log t) m <sup>2</sup> /year	(sqrt t) m <sup>2</sup> /year
1.4	0.000	25.000	1.000	13.888	1.250		
6.8	-0.005	25.005	1.000	13.893	1.250		
12.3	0.013	24.993	1.000	13.881	1.249	18.06	48.20
23.1	0.060	24.932	0.997	13.820	1.244	18.04	30.82
44.8	0.133	24.799	0.992	13.687	1.232	17.96	30.67
88.1	0.167	24.632	0.985	13.520	1.217	15.99	26.67
174.8	0.225	24.407	0.976	13.295	1.196	17.53	34.36
348.3	0.484	23.923	0.957	12.811	1.153	11.91	20.41
695.1	1.419	22.504	0.900	11.392	1.025	2.48	6.61
1388.8	2.235	20.269	0.811	9.157	0.824	1.10	2.25
88.1	-1.310	21.579	0.863	10.467	0.942		
6.8	-0.965	22.544	0.902	11.432	1.029		

Overburden Pressure  $P_o$  kpa

Pressure  $P_i$   $P_o + 100$  kPa

Thickness at  $P_o$   $H_o$  mm

Thickness at  $P_i$   $H_i$  mm

Voids Ratio at  $P_o$   $e_o$

Voids Ratio at  $P_i$   $e_i$

Coefficient of Compressibility  $M_v$  m<sup>2</sup>/MN

$$\frac{(e_o - e_i) \cdot 1000}{(1 + e_o)(P_i - P_o)}$$



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Please reply to: W.E. Campton

Page 1 of 3

Babbage Consultants Limited  
P O Box 2027  
Auckland 1140, New Zealand

Job Number: 42608/GE

Attention: Russell Allison

Checked by:   
WEC  
2<sup>nd</sup> November 2006

Dear Sir,

**Re: West Coast Road  
Triaxial Testing - Quick Undrained  
Report Number 42608/QUT Aug 06 Rev A**

The following 2 pages presents the results of Compressive Strength in Undrained Triaxial Compression without Measurement of Pore Water Pressure testing on two tube samples collected by this laboratory on the 18<sup>th</sup> July 2006. The 60 mmØ tube samples were tested in accordance with the following standard:

**BS1377 :1990 :Part 7 Section 8**

Each sample was set up in a triaxial cell with a covering membrane (0.4mm thick), and the cell filled with water. Cell pressure was then raised to 100kPa, and tested without confirming saturation or allowing for consolidation.

The loading machine was adjusted and rate of compression set to induce failure at 5 min to 10 min (from triaxial test results). Load versus strain was measured until failure, or until 20% strain.

The table below summarises the test results.

Sample Number	Depth	Dimensions	Bulk Density	Moisture Content	Dry Density	Deviator Stress	Strain %
BH1, T1	1.5m	60mmDx 125mmL	1.72t/m <sup>3</sup>	44.9%	1.18t/m <sup>3</sup>	54kPa	8.1%
BH2, T1	3.0m	60mmDx111mmL	1.52t/m <sup>3</sup>	70.4%	0.90t/m <sup>3</sup>	123kPa	3.2%

Yours faithfully,



Wayne Campton  
**Signatory (Laboratory Manager)**  
Babbage Geotechnical Laboratory



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

Job No:  
42608Reg. No:  
1503Report No:  
42608/QUT Rev A

Page 2 of 3

Issue Date: Aug-06

PROJECT:  
West Coast Road**Undrained Shear Strength in Triaxial Compression  
Without PWP Measurement**

Test Method: BS1377:1990:Part 7 Section 8

Tested By:

Initials

wec

Date

Jul-06

Compiled By:

comp

Aug-06

Checked By:

wec

2/11/06

Bore Number: BH1

Sample Number: T1

Depth: 1.5

Test Performed on: Whole soil / Fraction passing 10mm test sieve

Sample History: Undisturbed / remoulded / recompacted / unknown

Sample Method & Type: From core sample / larger tube / block sample / pressed into tube /  
compacted with standard/heavy compactive effort

Cell Confining Pressure Set at: 100 kPa

Sample Description:

Membrane Thickness 0.4mm

Membrane Correction 1

**Determination of Bulk Density:**

Diameter of Specimen:	(mm)	60.00
Initial Area of Specimen:	(mm <sup>2</sup> )	2827.43
Initial Length:	(mm)	125.00
Initial Mass:	(g)	609.61
Volume	(mls)	353.43
Bulk Density:	(t/m <sup>3</sup> )	1.725
Proving Ring No:		10-13232
Calibration Constant	(N/mm)	1491.75
Rate of Strain:	(%/min)	1.25

**Determination of Water Content:**

Container Number:	96
Mass container + wet soil:	187.851
Mass container + dry soil:	146.091
Check container + dry soil:	146.091
Mass of container:	53.014
Water Content: (%)	44.9
Dry Density: (t/m <sup>3</sup> )	1.191

Time	Compression Gauge (mm)	Specimen Compression (mm)	Strain	Load Gauge (mm)	Axial Force (N)	Corrected Area (mm <sup>2</sup> )	Measured Deviator Stress
14:01:26	0.334	0.000	0.000	-2.949	0.0	2827.4	0
14:01:57	1.063	0.729	0.006	-2.925	36.7	2844.0	13
14:02:27	1.843	1.509	0.012	-2.897	78.7	2862.0	27
14:02:58	2.624	2.290	0.018	-2.882	100.0	2880.2	35
14:03:28	3.409	3.075	0.025	-2.871	116.6	2898.7	40
14:03:58	4.197	3.863	0.031	-2.869	120.1	2917.6	41
14:04:29	4.979	4.644	0.037	-2.860	133.2	2936.5	45
14:04:59	5.760	5.426	0.043	-2.856	139.3	2955.7	47
14:05:30	6.545	6.210	0.050	-2.851	146.0	2975.3	49
14:06:00	7.334	7.000	0.056	-2.847	153.0	2995.2	51
14:07:31	9.697	9.363	0.075	-2.839	163.8	3056.4	54
14:08:02	10.485	10.150	0.081	-2.835	169.9	3077.3	55
14:08:32	11.263	10.928	0.087	-2.846	153.4	3098.3	50
14:09:02	12.048	11.714	0.094	-2.844	156.8	3119.8	50
14:09:33	12.821	12.487	0.100	-2.859	135.0	3141.2	43

Failure Conditions:

Maximum Deviator Stress

54 kPa

Cu

27 kPa

Strain at failure:

8.1 %

Mode of Failure: plastic

10.15 mm

PROJECT:  
West Coast Road

Undrained Shear Strength in Triaxial Compression  
Without PWP Measurement

Test Method: BS1377:1990:Part 7 Section 8

Tested By:

Initials

Date

wec

Jul-06

Compiled By:

comp

Aug-06

Checked By:

wec

2/11/06

Bore Number: BH2

Sample Number: T1

Depth: 3

Test Performed on: Whole soil / ~~Fraction passing 10mm test sieve~~

Sample History: Undisturbed / ~~remoulded~~ / ~~recompacted~~ / ~~unknown~~

Sample Method & Type: From core sample / ~~larger tube~~ / ~~block sample~~ / ~~pressed into tube~~ /  
compacted with standard/heavy compactive effort

Cell Confining Pressure Set at: 100 kPa

Membrane Thickness 0.4mm

Sample Description:

Membrane Correction 0.3

**Determination of Bulk Density:**

Diameter of Specimen:	(mm)	60.00
Initial Area of Specimen:	(mm <sup>2</sup> )	2827.43
Initial Length:	(mm)	111.50
Initial Mass:	(g)	477.93
Volume	(mls)	315.26
Bulk Density:	(t/m <sup>3</sup> )	1.516
Proving Ring No:		10-13232
Calibration Constant	(N/mm)	1491.75
Rate of Strain:	(mm/min)	0.81

**Determination of Water Content:**

Container Number:	97
Mass container + wet soil:	152.883
Mass container + dry soil:	111.684
Check container + dry soil:	111.684
Mass of container:	53.151
Water Content: (%)	70.4
Dry Density: (t/m <sup>3</sup> )	0.890

Time	Compression Gauge (mm)	Specimen Compression (mm)	Strain	Load Gauge (mm)	Axial Force (N)	Corrected Area (mm <sup>2</sup> )	Measured Deviator Stress
15:32:38	-2.121	0.000	0.000	-2.927	0.0	2827.4	0
15:33:08	-1.674	0.446	0.004	-2.917	14.9	2838.8	5
15:33:38	-1.177	0.944	0.008	-2.907	30.2	2851.6	11
15:34:09	-0.710	1.410	0.013	-2.890	56.0	2863.7	20
15:34:39	-0.339	1.781	0.016	-2.794	198.6	2873.3	69
15:35:10	0.079	2.200	0.020	-2.738	283.2	2884.3	98
15:35:40	0.525	2.646	0.024	-2.706	330.6	2896.2	114
15:36:10	1.004	3.125	0.028	-2.692	351.7	2909.0	121
15:36:41	1.486	3.607	0.032	-2.685	361.5	2921.9	124
15:37:11	1.975	4.096	0.037	-2.687	359.3	2935.3	122
15:37:42	2.472	4.593	0.041	-2.694	347.5	2948.9	118
15:38:12	2.971	5.091	0.046	-2.703	334.1	2962.7	113
15:38:43	3.330	5.451	0.049	-2.761	248.9	2972.8	84

Failure Conditions: Maximum Deviator Stress 123 kPa

Cu 62 kPa

Strain at failure: 3.2 %

Mode of Failure: planar

3.61 mm

**Appendix D**  
**Slope Stability Analysis**

Babbage Consultants Limited - Auckland, NZ

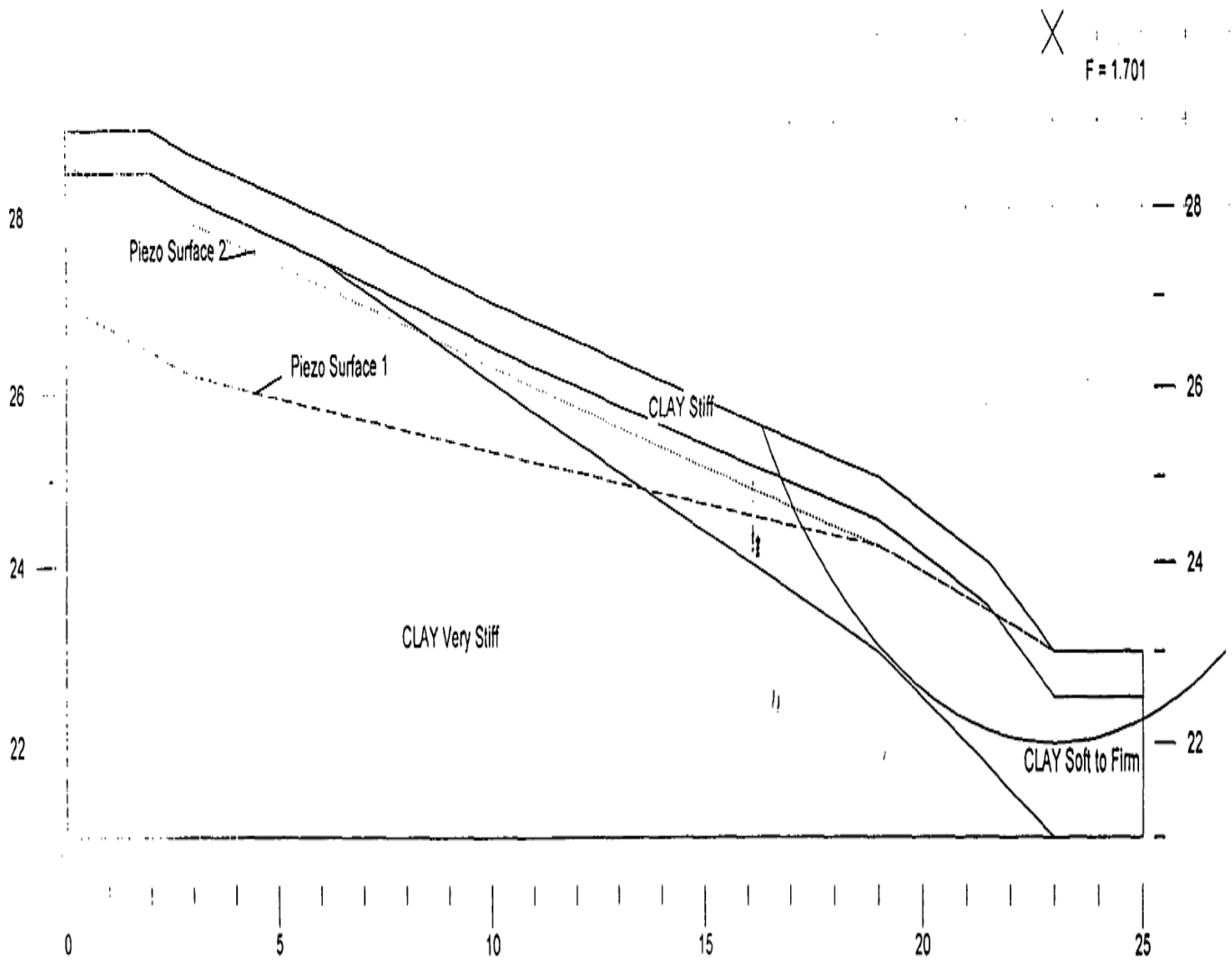
42608/GE

West Coast Road

7th November 2006

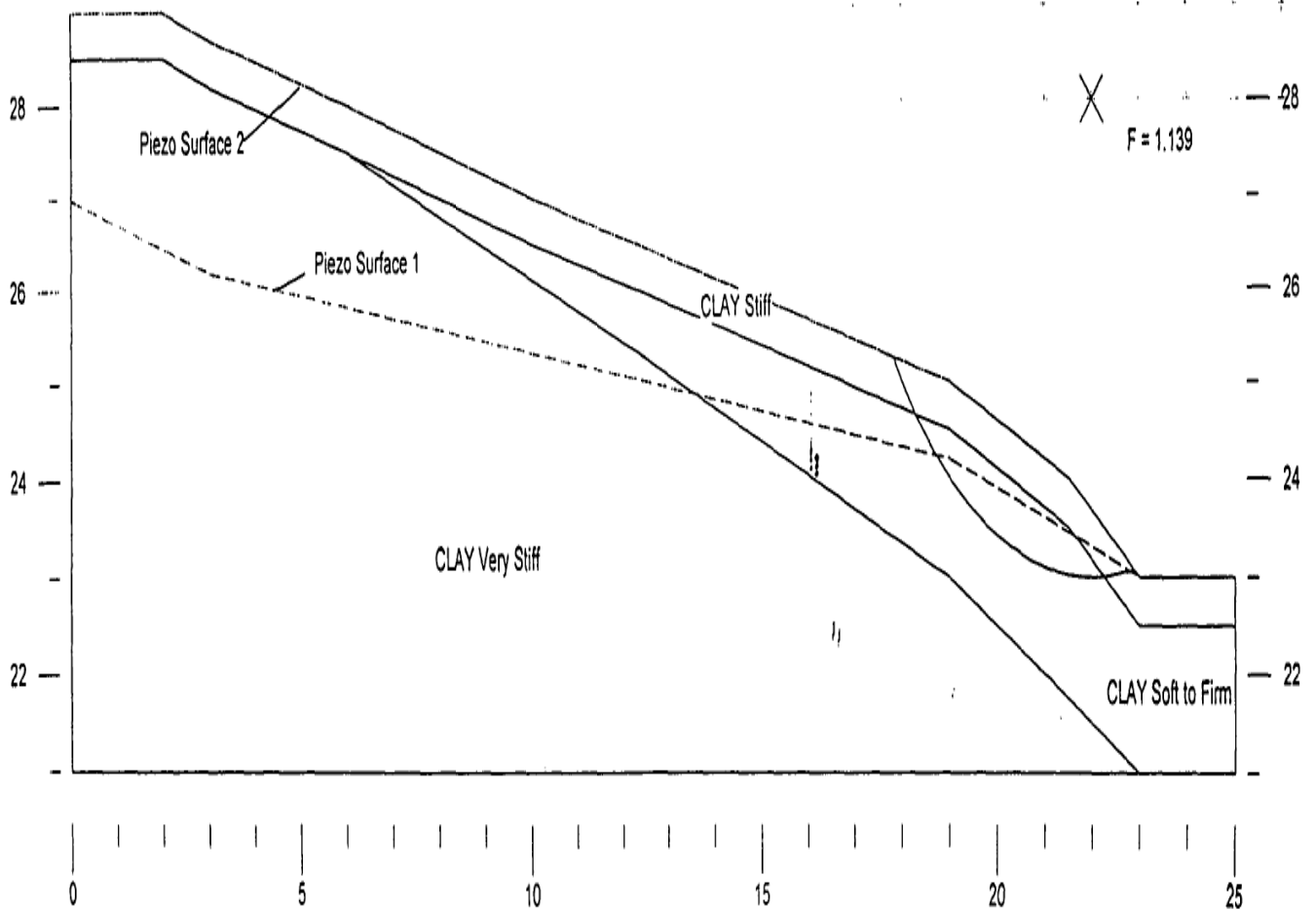
AA

	Gamma	C	Phi	Piezo	Ru
	kN/m <sup>3</sup>	kPa	deg	Surf.	
CLAY Stiff	13	5	30	1	0
CLAY Soft/Firm	13	2	27	1	0
CLAY Very Stiff	20	7	32	1	0



Babbage Consultants Limited - Auckland, NZ  
 42608/GE  
 West Coast Road  
 7th November 2006  
 AA

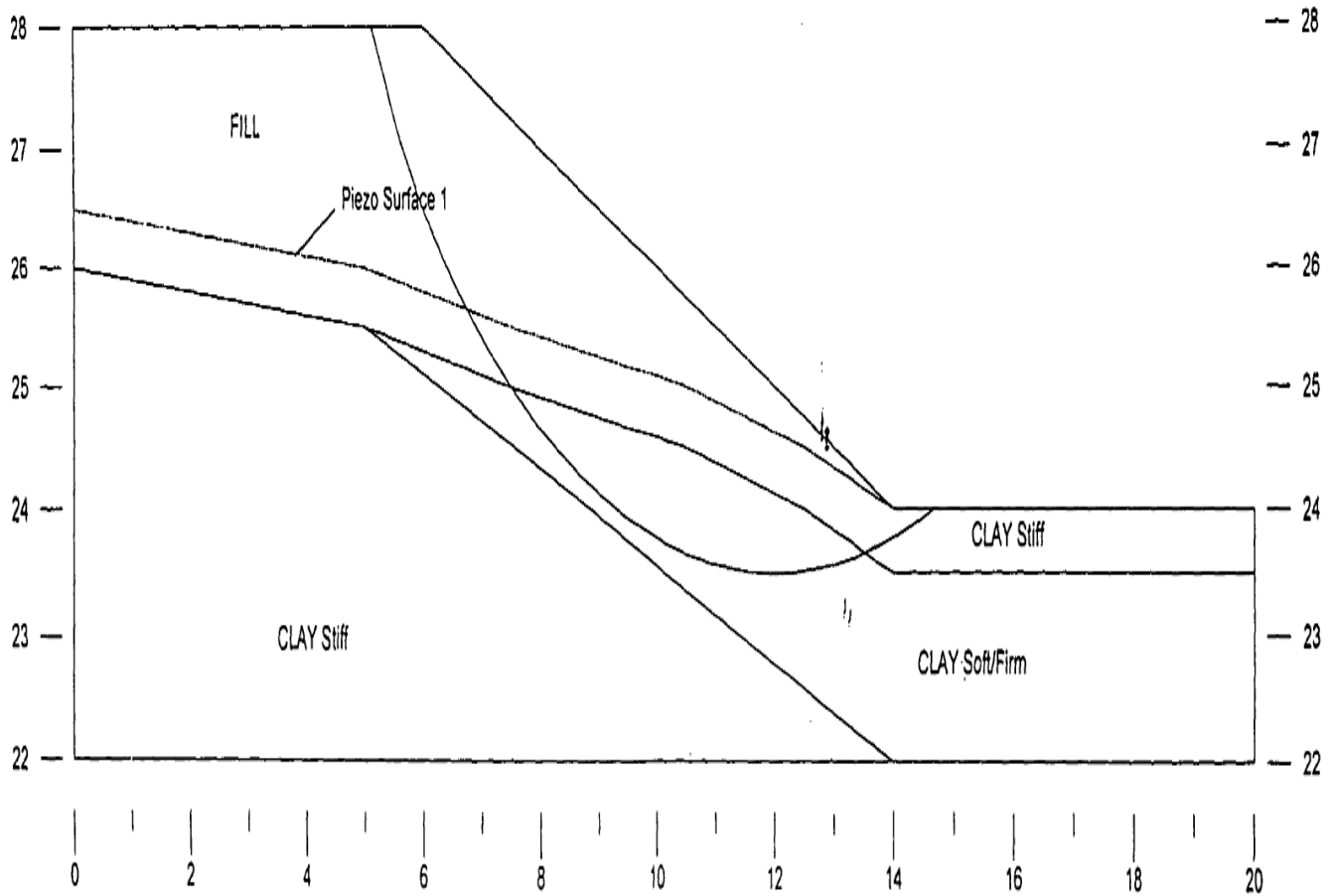
	Gamma C		Phi	Piezo	Ru
	kN/m3	kPa	deg	Surf.	
CLAY Stiff	18	5	30	2	0
CLAY Soft/Firm	18	2	27	2	0
CLAY Very Stiff	20	7	32	2	0



	Gamma	C	Phi	Piezo	Ru
	kN/m <sup>3</sup>	kPa	deg	Surf.	
Fill	17	5	30	0	0
CLAY Stiff	18	5	30	0	0
CLAY Firm	18	2	27	0	0
CLAY Stiff	18	5	30	0	0

Babbage Consultants Limited - Auckland, NZ  
42608  
West Coast Road  
7 November 2006  
Section BB

✕  
F = 1.846



Babbage Consultants Limited - Auckland, NZ

42608

West Coast Road

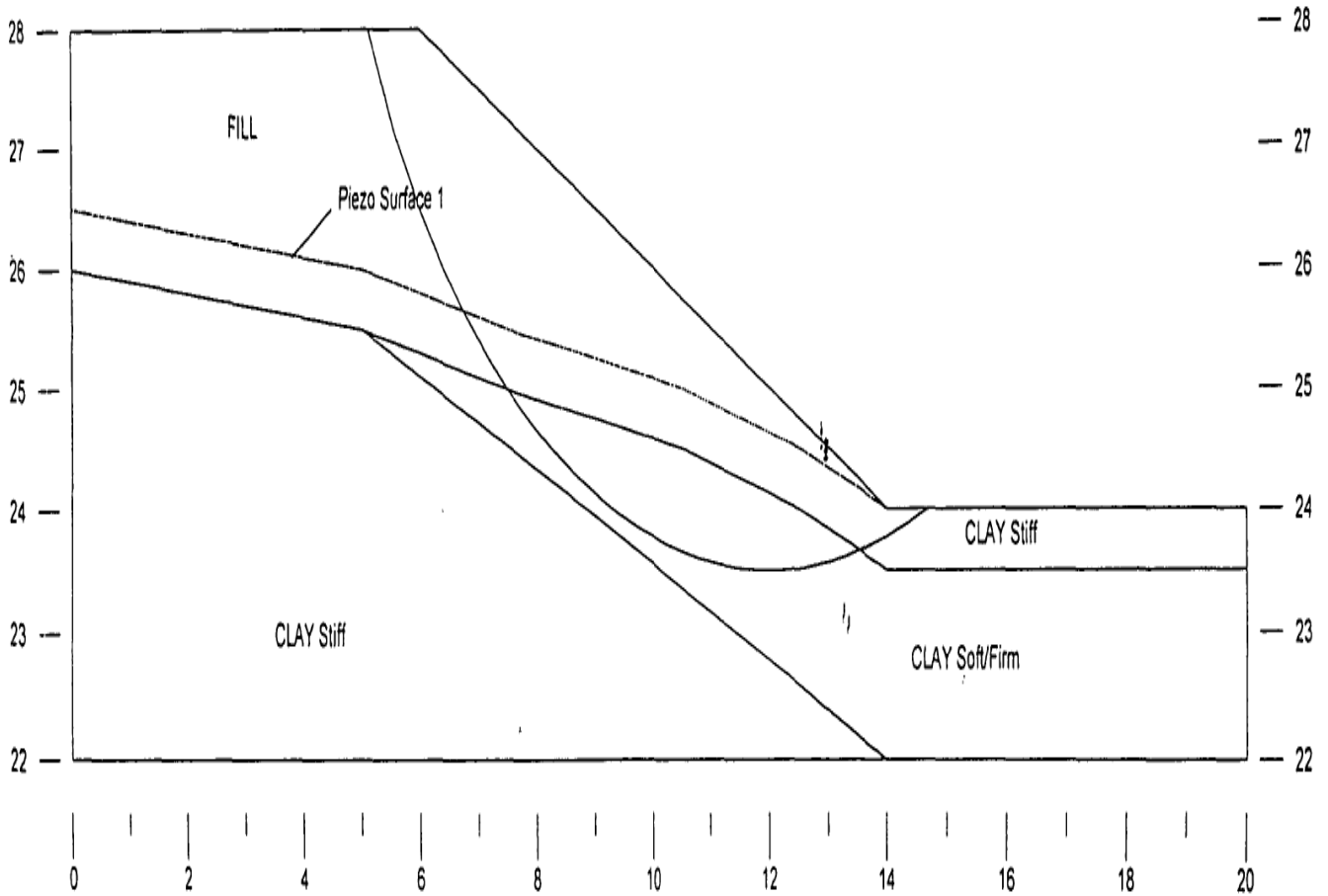
7 November 2006

Section BB

	Gamma	C	Phi	Piezo	Ru
	kN/m3	kPa	deg	Surf.	
Fill	17	5	30	1	0
CLAY Stiff	18	5	30	1	0
CLAY Firm	18	2	27	1	0
CLAY Stiff	18	5	30	1	0

X

F = 1.422



**WEST COAST ROAD  
(NO.423-429), HOUSING  
DEVELOPMENT  
STAGES 2 AND 3  
AND BALANCE STAGE 1**

**FOR**

**NEW ZEALAND HOUSING  
FOUNDATION**

---

**EARTHWORKS COMPLETION REPORT**

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**Client:** New Zealand Housing Foundation

**Project:** West Coast Road Stages 2 and 3

**Job Number:** 42608

**Report Title:** Earthworks Completion Report

**Document Reference:** BDOC03675709

**Report Date:** March 2008

-		First Issue	W E Campton	N.S. Luxford
Issue	Date	Status	Prepared By	Reviewed By

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## **APPENDIX A**

### **Statement of Professional Opinion**

#### **Site Location Plan**

Drawing 42608/G01

#### **As-Built Cut and Fill Isopach Plan Stg 1**

Drawing No. 42608/AB05

#### **As-Built Cut and Fill Isopach Plan Stg 2 and 3**

Drawing No. 42608/AB12

#### **Fill Test Location Plans**

Drawing No. 42608/G06

Drawing No. 42608/G07

#### **As-Built Drainage Plans**

Drawing No. 42608/AB08

42608/AB09

#### **Retaining Wall Plan**

Drawing No. 42608/C51

#### **Retaining Wall Detail**

Drawing No. 42608/C52

## **APPENDIX B**

### **Fill Test Result Summary**

### **Settlement Marker Records**

## 1.0 INTRODUCTION

Babbage Consultants Ltd were engaged by New Zealand Housing Foundation to monitor the construction of earthworks and retaining walls for the West Coast Road Subdivision carried out in the 2006/2007 earthworks season. This report presents the results of work carried out by Babbage to verify the Stage 2 and Stage 3 earthworks and construction of the associated ponds and retaining walls and lots 19 to 22 of Stage 1. Stage 1 has been reported previously – refer to our Earthworks Completion Report dated October 2007, ref 43608/GE and excepted these four lots.

The development covers Lots 2 & 3 DP 339810, 423 – 429 West Coast Road, Henderson, as shown on the Site Location Plan in Appendix A. Stage 2 is bounded to the south by existing residential properties abutting West Coast Road and to the east by residential properties adjacent to Woodbank Drive. Most of the western boundary is generally marked by Parrs Stream, and the Stage 1 development demarks the northern extent. Access to Stage 2 is via Pyramid Place. Stage 3 is on the western bank of Parrs Stream, with access off West Coast Road to the south, and the Albionvale Road residential development abuts the western and northern boundary.

A walk-over survey of the site was undertaken as part of our geotechnical investigation prior to development. No apparent signs of previous slope instability were observed.

The two stages cover an area of approximately 2.3ha and includes residential Lots 36 to 60, with Lots 61 to 64 being road and drainage reserves. We have also included Lots 19 to 22 which were part of stage 1 works, but had been occupied by contractor's site offices and a topsoil stockpile. These have now been removed from the site. The majority of the proposed residential dwellings are understood to comprise two-storey structures.

## 2.0 CONSTRUCTION SEQUENCE SUMMARY

Earthworks commenced on site in December 2006, with the construction of the permanent stormwater pond on the northern portion of the stage 1. Once this stage was substantially complete, the southern area (Stage Two) was stripped

of topsoil and saturated alluvial deposits that were identified in the geotechnical investigation phase. Underfill drainage was installed, along with deeper batter drains to ensure soft soils would consolidate as earthworks progressed. The volume and extent of saturated soils proved to be less than anticipated from information provided by our geotechnical investigation. Fill areas alongside the southern boundary and the southeast side of Parrs Creek were then brought up to design levels. A surplus of approximately 20,000m<sup>3</sup> of clean clay fill was removed from site during these works. A smaller surplus had been calculated after we had anticipated excavating soft alluvial materials from Stage 2. A decision to leave these in place meant that the clay was not required, and this was transported from site.

Areas of the site that were found to be contaminated with pesticides from previous land use and zinc from neighbouring buildings were remediated during earthworks. Pesticide affected soils were removed from site and samples taken to confirm that all materials had been removed. Zinc-contaminated sediments were found in the sludge sediments at the base of the stormwater pond located on the western side of Parrs Creek (Stage 3), just to the north of West Coast Road.

Once earthworks were completed on Stages One and Two, and drainage lines were able to be constructed, Stage Three earthworks commenced. Site access off West Coast Road was formed and platform levels to the west of Parrs Creek were built up. The contaminated sludge was removed and the silt pond backfilled. This operation was carried out in two parts, with the southern portion of the pond backfilled in late April 2007, and the northern portion backfilled in the 2007/8 constructions season once drainage lines had been completed.

### **3.0 CONSTRUCTION MONITORING AND TESTING**

#### **3.1 GENERAL**

The stripped gullies in all fill areas were inspected by Babbage Consultants Ltd during earthworks construction. Underfill drainage was placed and observed during these regular inspections. Approval was given to commence filling once we were satisfied that all deleterious material had been removed from the fill areas, and vegetation had been removed.

The specification for placement of earthworks fill material was prepared by BCL. The specification required that the fill be placed in layers up to 200mm thick and compacted by at least 6 passes of a 10 ton self-propelled or a towed tamping type steel wheeled roller. We understand that approximately 10,000m<sup>3</sup> of material was placed in fill areas in the 2006/2007 earthworks season, with minor works in late 2007/early 2008 to complete Stage 3 trimming.

The relative compaction, determined by comparing the in-situ density with that of a sample compacted in the laboratory accordance with Test 4.1.1 of NZS4402:1986, was to be greater than 95%. The specification also required that the maximum in situ air voids of the fill was to be 8%. The minimum average in situ shear strength of the fill was required to be greater than 120kPa with no individual value less than 100kPa.

The in situ density of the fill material has been determined using a nuclear densometer. The nuclear densometer has been calibrated in accordance with NZS4407:1991, Test 4.2.3 by using three density blocks in an accredited testing workshop. The in situ moisture content has been determined by testing a sample recovered from the test site in our laboratory in accordance with NZS4402:1986, Test 2.1. The in situ dry density and air voids have been calculated using the laboratory moisture content. The in situ shear strength of the fill was measured using a hand held Pilcon Shear Vane. Areas of fill that failed to meet the specified criteria were reworked and retested or observed by a Babbage representative and identified as being satisfactorily compacted.

The bulk of earthworks fill placement for Stage 1 and 2 were programmed for the one earthworks season. The site was visited by BCL to undertake fill testing during the 2007 construction season. A total of 35 in-situ density tests were completed during these visits. This also included fill placement on Stage 3, once settlement ponds were decommissioned.

The location of in situ density tests are shown on Drawing Nos. G06 and G07 – Fill Test Location Plans, in Appendix A. The dates that the fill testing has been undertaken and results of the fill testing are presented on the Fill Test Result Summary attached in the Appendix B.

A number of settlement markers were installed on Stage 2 fill areas where alluvial soils remain. These were monitored until it was confirmed that all settlement was

substantially completed. Recordings were terminated in November 2007 when no significant settlement was recorded (see attached records in Appendix B).

### 3.2 ROAD SUBGRADES

The specifications for pavement design under roads called for 250mm of basecourse on top of lime stabilised subgrade. An alternative design of 200mm sub-basecourse and 150mm basecourse was considered if lime stabilisation did not improve the subgrade. Scala penetrometer readings were taken on all road subgrades after lime stabilisation and these confirmed that substantial improvement had occurred.

### 3.3 BUILDING FOUNDATIONS

The near surface materials exposed in the cut areas are typically stiff to very stiff and support the passage of construction plant when dry. In general all cut and fill areas are suitable in which to construct foundations complying with the requirements of NZS3604:1999 except where noted below.

On Lots 46 to 56 (Stage II) and Lots 57 to 60 (Stage III) where structures are located close to the common boundary with Parrs Stream all footings located within a zone of 1(v) in 3 (h) measured from the toe of the batter falling to the stream should be founded on piles. This is to minimise the risk of loss of support should localised frittering and/or creep and movement of this batter slope occur. These piles should be designed to provide their support of the building load below this 1 in 3 batter using the assumption of a safe adhesion of 25kPa.

The placement of fill over compressible deposits on Lots 44 to 53 had the potential to cause consolidation and induce settlement. Settlement monitoring pins were installed to enable the rate and amount of settlement to be observed and the consolidation rate assessed. As mentioned previously, these monitoring pins were checked over time to determine when development could proceed in this area. This decision was made in November 2007 when no significant settlement between successive readings was observed.

Any perimeter foundations that are not taken to 600mm below finished ground level (and especially where waffle slabs are proposed) should be carried on piles. Where waffle slabs are used, these piles should be provided around the perimeter of the slabs. Areas which are stripped of topsoil prior to placement of waffle slabs or slabs

on grade which are allowed to dry out should be thoroughly soaked to return the moisture content to a moist state prior to construction of the slab.

A check on topsoil depths after spreading on Lots 19 to 23 (Stage 1) and Lots 36 to 56 (Stage 2) shows that topsoil generally varies from 200mm to 400mm thick. Stage 3 had not had topsoil spread at time of preparation of this report, although other fill placement had been completed. Lot 55 showed a depth of moist highly plastic material to 1m. This Lot is close to Parrs Stream and ground slopes towards the stream directly from the road. Footings on this lot will need to be taken below this layer. Foundations for this lot will need to be piled (see above 1 in 3 batter criteria), and footings inspected prior to construction.

All topsoil should be removed from beneath slab on grade floors in all Lot development.

#### **4.0 SUMMARY AND RECOMMENDATIONS**

##### **4.1 GENERAL**

In our opinion, based on our site observations and testing, the fill materials on West Coast Road (Nos. 423 – 429) Stages 2 and 3 and balance of Stage 1, have generally been placed in accordance with the Specification and NZS4431:1989 Code of Practice for Earthfill for Residential Development, except that the minimum requirement for the peak in situ shear strength of the fill materials are as detailed in Sections 4.2 of this report. In our opinion there is no evidence to indicate that land formed on this part of the subdivision will be subject to any instability unless future earthworks create such instability.

Any dwellings created under the normal items of NZS3604:1999 within the normal building envelope will in our opinion be within stable land in the lots with the noted exception of lots abutting Parrs Stream (see section 3.3 – Lots 23, 46 to 55 and lots 57 to 60 ). These building platforms require piles designed as per Section 3.3.

Our geotechnical assessment of the subdivision classified most soils as Class M from AS2870:1996. We have not undertaken any testing to confirm this, however descriptions of fill materials during fill certification were consistent with the earlier geotechnical assessment. We recommend that strip footings be taken to 600mm below finished ground surface to allow for shrinkage – swell movements.

This will not restrict uplift of "waffle-slab" foundations constructed from polystyrene packed concrete. As such we recommend that any such proposed foundation be placed after thoroughly wetting up of the soil to minimise the risk of swelling and that the perimeter of each slab is extended to a minimum depth of 600mm below finished ground level or piled to minimise the affects of shrinkage and swell. Prior to construction it is recommended that the subgrade is inspected by a Geotechnical Engineer to confirm the shrinkage/swell potential

#### **4.2 SUITABILITY OF EARTHFILL – LOTS 36, 37, 44 TO 60**

In our opinion, based on our site observations and testing, the fill materials as shown on Drawing G12 are generally suitable for the development of light timber framed buildings designed in accordance with NZS3604:1999. We recommend that combined floor loads be less than 15kPa, including the weight of any proposed slab and fill, and ultimate foundation bearing pressures be less than 300kPa (*i.e. an allowable bearing pressure of 100kPa using a factor of safety of 3*). The natural insitu silts and clays are anticipated to also be suitable for foundations designed to similar bearing pressures.

We note that footings should be taken to at least 600mm below finished ground level to minimise the effects of shrinkage / swell movements.

#### **4.3 SUITABILITY OF NATURAL SOILS (LOTS 19 -22 STAGE 1) (LOTS 38 – 42 STAGE 2 & LOT 61 STAGE 3)**

From our inspection of cut platforms and drainage lines within areas of cut we can confirm that natural soils exposed are as anticipated from our geotechnical appraisal of the site. Any dwellings created under the normal items of NZS3604:1999 within the normal building envelope will in our opinion be within stable land in the lots.

We note that footings should be taken to at least 600mm below finished ground level to minimise the effects of shrinkage / swell movements. We recommend that normal inspection of footings during the building process be carried out by a suitably qualified geotechnical engineer or his representative to confirm the ground conditions.

#### **4.4 RETAINING WALLS**

Retaining walls adjacent to vehicle accessways have been designed and constructed to support a 5kPa surcharge. All other walls have not been designed and constructed

to support a surcharge and therefore it is recommended that no additional fill or structure is located at the top of such walls within a minimum horizontal distance equal to the retained height of the wall.

#### **4.5 ROAD SUBGRADES**

Testing of road subgrades after lime stabilisation confirmed that the design CBR criteria was met in both cut and fill areas. Roads were constructed using basecourse at the specified metal depths.

#### **5.0 LIMITATIONS**

##### **5.1 RESTRICTION OF INTENDED PURPOSE**

This report has been prepared solely for the benefit of New Zealand Housing Foundation as our client with respect to the brief and the benefit of the Waitakere City Council. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

##### **5.2 LEGAL INTERPRETATION**

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate legal advice.

##### **5.3 RELIABILITY OF INFORMATION**

Recommendations and opinions in this report are based on data from our investigation and control testing on this site. As we were not on site full time during earthworks, the nature and continuity of subsoil conditions could vary from the assumed model.

During excavation and construction the site should be examined by an Engineer or Engineering Geologist competent to judge whether the exposed subsoils are compatible with inferred conditions.

Babbage Consultants would be pleased to provide this service and believe that the development would benefit from this continuity. In any event it is essential that

Babbage Consultants Ltd be contacted if there is any significant variation in subsoil conditions from those described in this report.

This report has been prepared by Wayne Campton and reviewed by N.S. (Paddy) Luxford.

Respectfully submitted  
**Babbage Consultants Limited**



N S Luxford.....  
**Geotechnical Engineering Director**

## Appendices

### Appendix A

Statement of Professional Opinion

Site Location Plan

Drawing 42608/G01

As-Built Cut and Fill Isopach Plan Stg 1

Drawing No. 42608/AB05

As-Built Cut and Fill Isopach Plan Stg 2 and 3

Drawing No. 42608/AB12

Fill Test Location Plans

Drawing No. 42608/G06  
Drawing No. 42608/G07

As-Built Drainage Plans

Drawing No. 42608/AB08  
42608/AB09

Retaining Wall Plan

Drawing No. 42608/C51

Retaining Wall Detail

Drawing No. 42608/C52

To:	Waitakere City Council Private Bag 93 109 Henderson Waitakere City 1231
-----	--

**STATEMENT OF PROFESSIONAL OPINION AS TO  
SUITABILITY OF LAND FOR RESIDENTIAL DEVELOPMENT**

Subdivision: **423-429 West Coast Road, Stage 2 & 3  
Lots 2 & 3 DP.339810**

Owner/Developer: **New Zealand Housing Foundation**

Location: **Henderson**

I, **N S Luxford of Babbage Consultants Ltd**, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering and was retained by **New Zealand Housing Foundation** as the Geotechnical Engineer on the above subdivision.
2. The extent of my inspections, and the results of all tests carried out during construction, are described in my report entitled **"West Coast Road (No.423-429), Housing Development Stages 2 and 3 and Balance Lot 1 Earthworks Completion Report"**, Ref. 42608/GE, March 2008.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
  - (a) The earth fills shown on **Drawing 42608/AB05 and AB12** attached to the above referenced Earthworks Completion Report, have generally been placed in compliance with **NZS4431:1989 Code of Practice for Earthfill for Residential Developments**.
  - (b) The completed works give due regard to land slope and foundation stability considerations.
  - (c) The filled ground, is suitable for the development of residential buildings, designed in accordance with NZS3604:1999, provided combined floor loads are less than 15kPa, including the weight of the slab and fill.
  - (d) The original ground not affected by filling is suitable for the development of residential structures designed in accordance with NZS3604:1999, provided combined floor loads are less than 15kPa, including the weight of the slab and fill.
  - (e) The earthworks associated with the roads and reserves have been carried out in a manner appropriate for their intended purpose.
  - (f) The following special limitations should be observed:
    - (i) Any building foundation constructed above a gradient line of 1v to 3h from the toe of the fill slope should be piled and be subject to specific design by a suitably qualified engineer.
    - (ii) The excavations for foundations in natural materials should be subject to normal inspections to confirm that they comply with the requirements of NZS3604:1999.
    - (iii) The minimum depth of all perimeter foundations for future buildings, are to be 600mm below finished ground level to minimise the effects of shrinkage swell movements on the structure.

- (iv) Lot 55 showed moist highly plastic material to a depth of 1m. Pile foundations should be taken below this material and inspected by a suitably qualified geotechnical engineer.

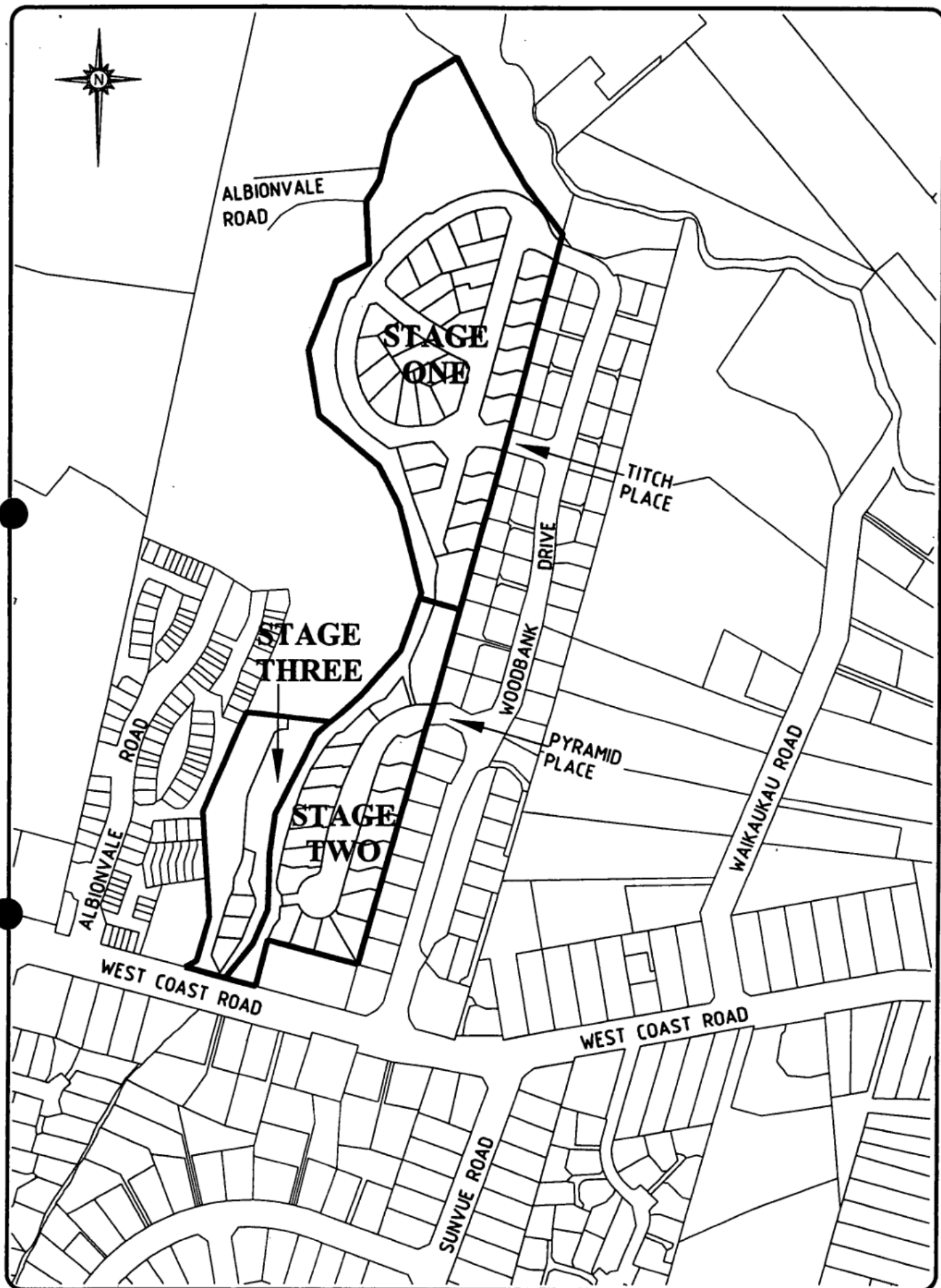
4. This professional opinion is furnished to the **Waltakere City Council and New Zealand Housing Foundation** for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: .....

N S Luxford

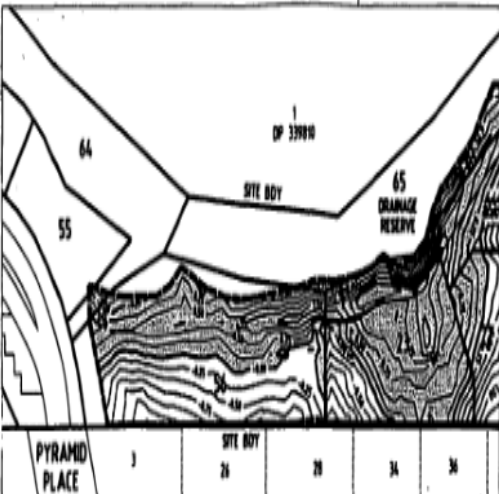
Chartered Professional Engineer (CPEng No 41147)

Date: 14<sup>th</sup> March 2008

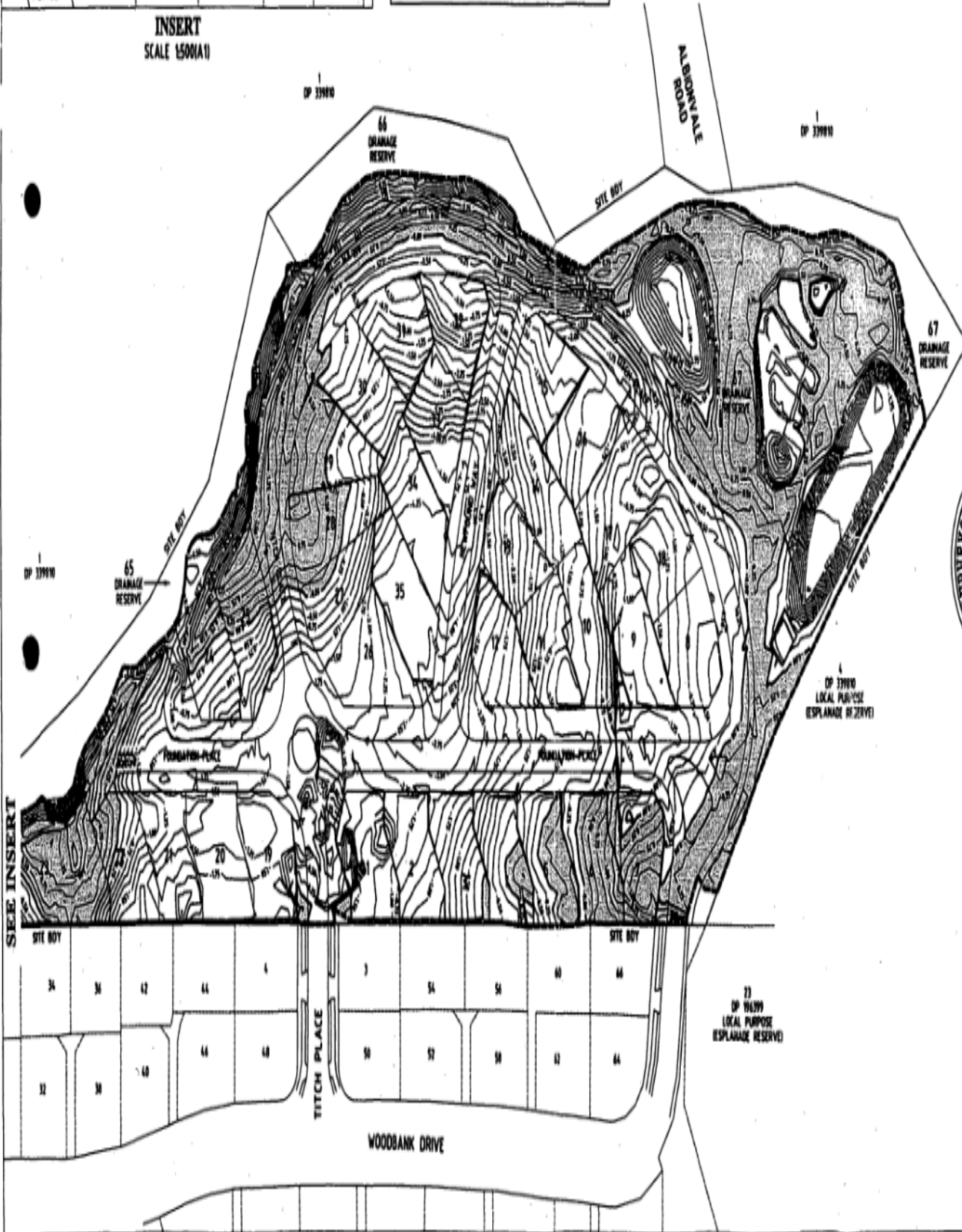


**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

JOB NO:	42608
TITLE:	SITE LOCATION PLAN
SCALE:	NOT TO SCALE
DRAWING:	G01 (REV A)



**INSERT**  
**SCALE 1:500(A1)**



### KEY

I, KEVIN RAYMOND MEULE, LICENSED SURVEYOR, HEREBY CERTIFY THAT ALL AS BUILT DATA SHOWN ON THIS PLAN IS ACCURATELY PLOTTED IN RELATION TO LOT BOUNDARIES, IS IN TERMS OF GEODETIC DATUM 2000 (NAD 83), ELEV. ORIGIN IS LANDS AND SURVEY LEVEL DATUM 1984.

DATE: \_\_\_\_\_

K.R. MEULE  
LICENSED SURVEYOR

## NOTES

[illegible]

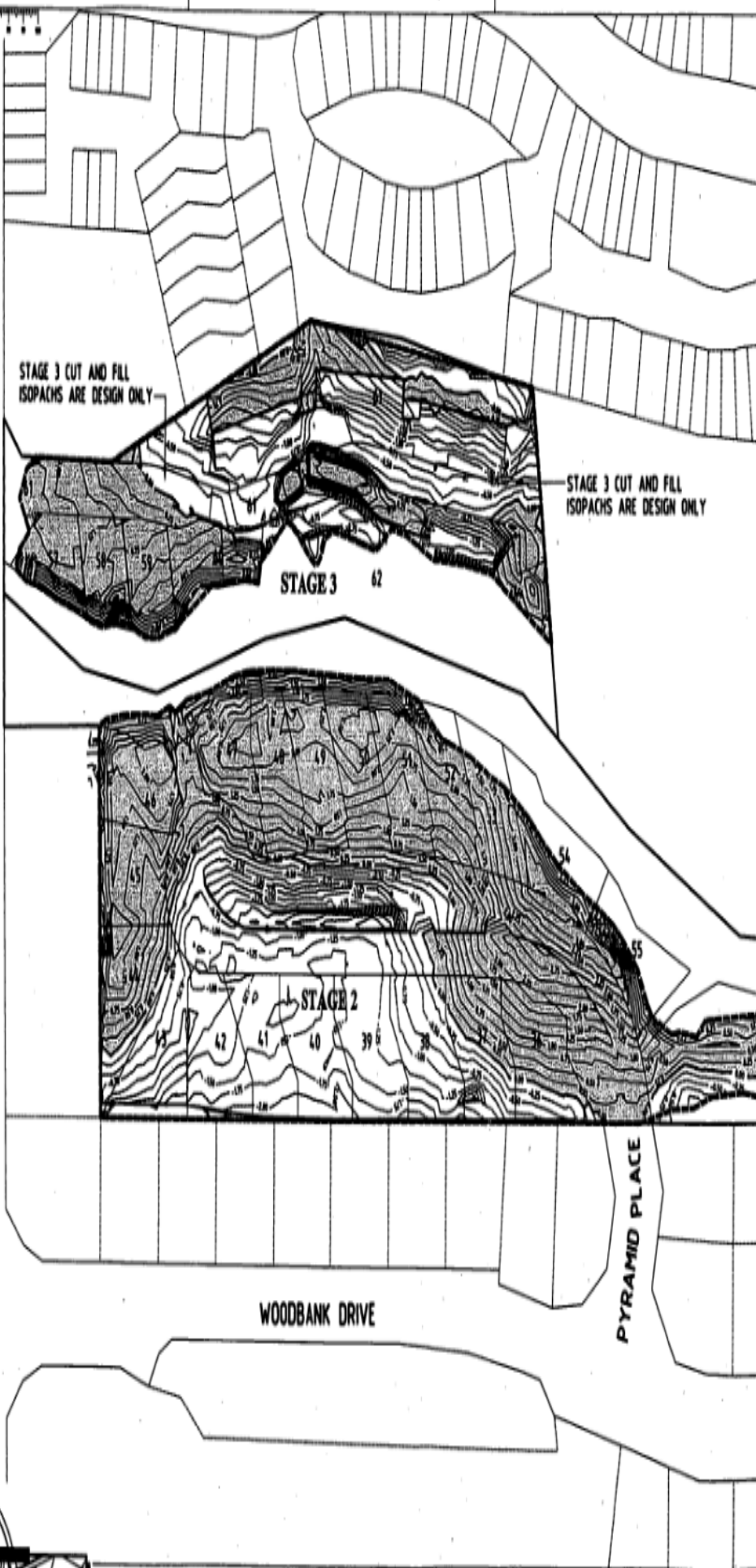
100 FAIRVIEW STREET  
PO BOX 3027  
AUCKLAND 1 - NEW ZEALAND  
PHONE 09 - 379 0888 • FAX 09 - 377 1171  
[www.greengrass.co.nz](http://www.greengrass.co.nz)

CLIENT / PROJECT  
423 - 429 WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

<b>DRAWING TITLE</b>		
<b>STAGE ONE CUT AND FILL ISOPACH AS BUILT</b>		
<b>SHEET NO.</b>		
<b>DATE</b>	<b>INITIAL</b>	
<b>DRAWN</b>	<b>OCT 2007</b>	<b>NAD</b>
<b>CHECKED</b>		
<b>APPROVED</b>		

SCALE (ft)  
1:500

JOE NUMBER	DRAWING NUMBER	REVISION
42608	AB05	A



## NOTES

1. FILL AREAS ARE SHOWN SHADED
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS.
3. LEVEL DATUM - LANDS AND SURVEY LEVEL DATUM 1946.

### KEY

- ..... CUT CONTOURS  
 ..... FILL CONTOURS  
 ..... ZERO CUT/FILL  
 ■■■■■■■■■■ EXTENT OF EARTHWORKS

I KEVIN RAYMOND MENKE, LICENSED SURVEYOR, HEREBY CERTIFY THAT ALL AS BUILT DATA SHOWN ON THIS PLAN IS ACCURATELY PLOTTED IN RELATION TO LOT BOUNDARIES, IS IN TERMS OF GEODETIC DATUM 2000 INT. (EDEN CIRCUIT) AND LANDS AND SURVEY LEVEL DATUM 1944.

DATE: \_\_\_\_\_

K.R. MEHLE  
LICENSED SURVEYOR

WEST COAST RD

WOODBANK DRIVE

**PYRAMID PLACE**

[illegible]

	DATE	INITIAL
SURVEYED	JAN 2008	RDC
DRAIN	FEB 2008	WFO
CHECKED	FEB 2008	PK
APPROVED		

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CLIENT / PROJECT  
WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

DRAWING TITLE  
CUT & FILL  
ISOPACHS AS BUILT  
PLAN - STAGES  
2 AND 3

SCALE (A1)  
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	AB12	A

# KEY

3# APPROXIMATE LOCATION OF FILL TEST



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DRAWING NOTES

NO	DATE	DESCRIPTION	DRAWN	CHECK
1		ISSUED FOR TENDERS		
2		REVISED		
3		REVISED		
4		REVISED		
5		REVISED		
6		REVISED		
7		REVISED		
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44		REVISED		
45		REVISED		
46		REVISED		
47		REVISED		
48		REVISED		
49		REVISED		
50		REVISED		



18 FARMHOUSE STREET  
PO BOX 302  
AUCKLAND 1 - NEW ZEALAND  
PHONE 09-279 8800 • FAX 09-277 1170  
info@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

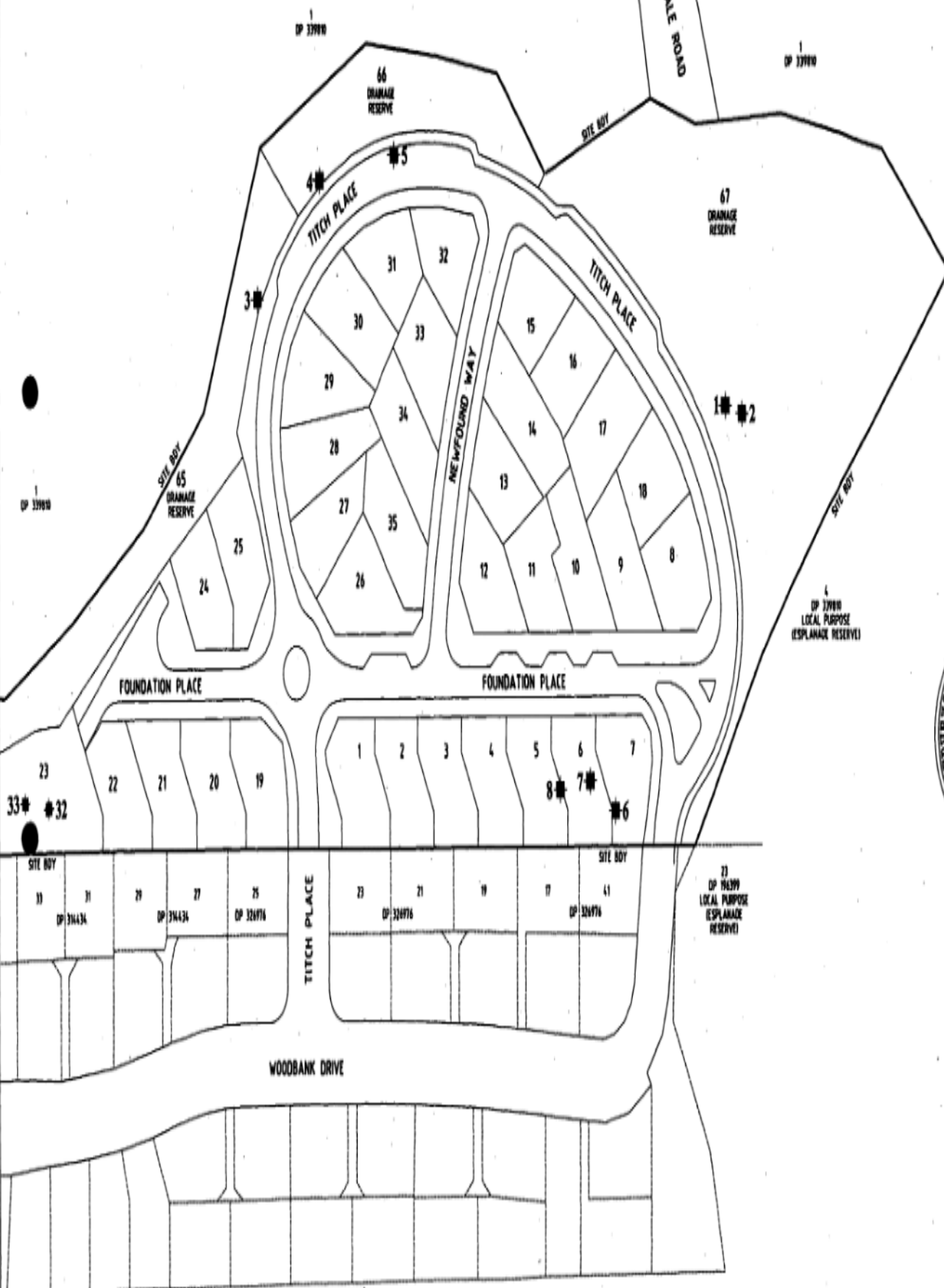
DRAWING TITLE  
**FILL TEST  
LOCATION PLAN**

DESIGNED	DATE	INITIAL
DRAWN	AUGUST 2017	MSD
CHECKED	AUGUST 2017	RA
APPROVED		

SCALE (M)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42808	G06	A



ALBION VALE DRIVE

WEST COAST RD

PYRAMID PLACE

WOODBANK DRIVE

PYRAMID PLACE

KEY

- 15# APPROXIMATE LOCATION OF FILL TEST
- 58 LOT NUMBER



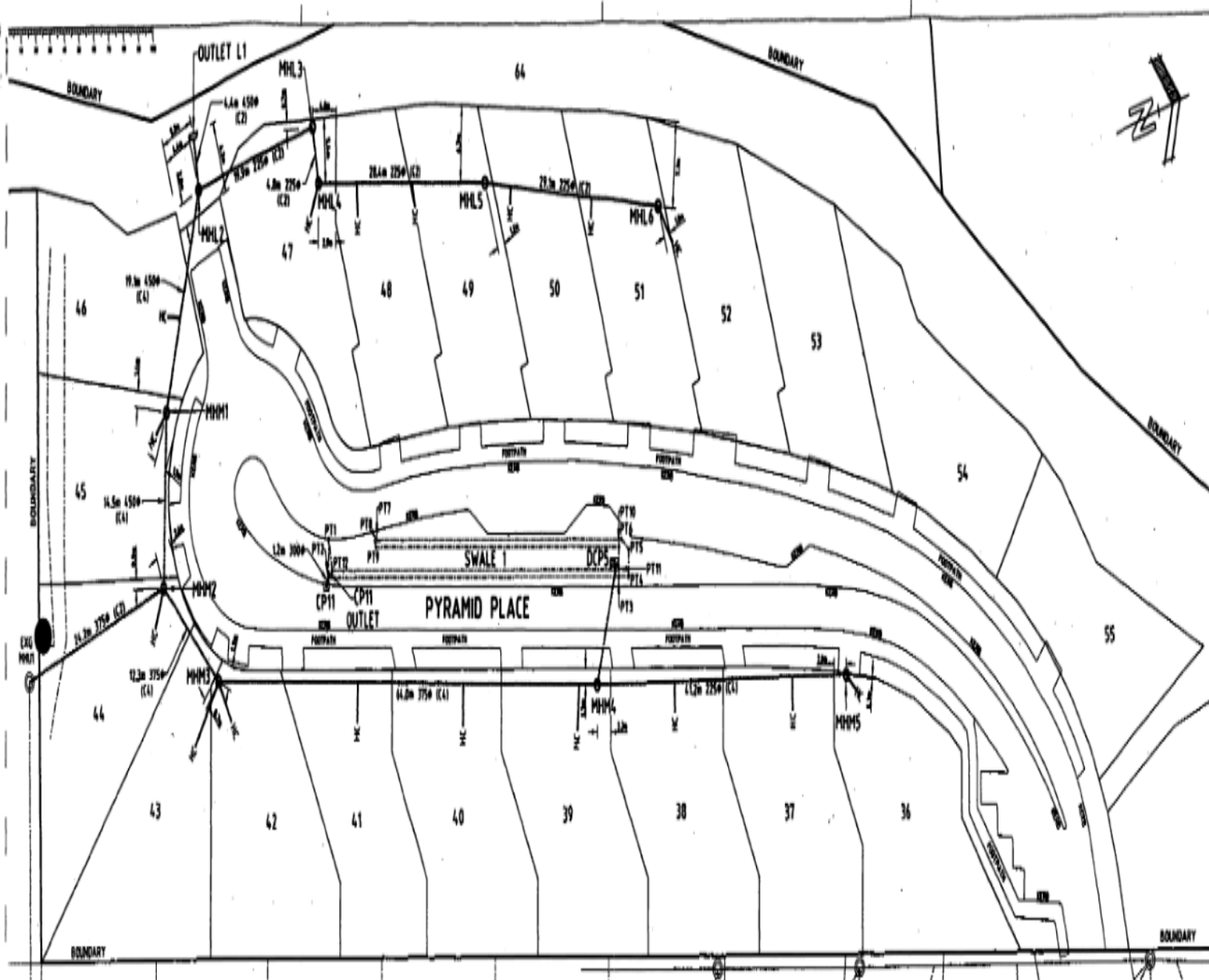
CLIENT / PROJECT  
 WEST COAST ROAD  
 HOUSING DEVELOPMENT  
 FOR  
 NZ HOUSING FOUNDATION

DRAWING TITLE  
 FILL TEST  
 LOCATION PLAN 2

DATE	REVISION
DESIGNED	
DRAWN	FEB 2008
CHECKED	FEB 2008
APPROVED	

SCALE (A1)  
 1:500

DATE	REVISION
42808	G07
	A



**KEY**

—	NEW STORMWATER LINE
- - -	EXISTING STORMWATER LINE
---	BANK LINE
MH10	MANHOLE
CP11	CATCHPIT (SINGLE)
DCPS	CATCHPIT (DOUBLE)
HC	HOUSE CONNECTION
IC1	PIPE CLASS

I, N. S. LUDFORD, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THE STORMWATER RETICULATION POSITIONS, SCHEDULE OF COORDINATES, LID LEVELS, DIMENSIONS AND PIPE SIZES ARE CORRECT AND THAT THE INFORMATION IS ACCURATE TO WITHIN NORMAL ENGINEERING AND SURVEY TOLERANCES.

DATE: \_\_\_\_\_

N. S. LUDFORD  
CHARTERED PROFESSIONAL ENGINEER

- NOTES**
- LEVELS ARE IN TERMS OF LANDS AND SURVEY (AUCKLAND) DATUM 1944.
  - COORDINATES ARE IN TERMS OF GEODETIC DATUM 1949.
  - ALL STORMWATER PIPES ARE CONCRETE RUBBER RING JOINTED UNLESS SHOWN OTHERWISE.
  - ALL MANHOLES ARE 1050W UNLESS SHOWN OTHERWISE.
  - ALL CATCHPIT LEADS ARE 225W UNLESS SHOWN OTHERWISE.
  - ALL HOUSE CONNECTIONS ARE 100W UPVC SWK UNLESS SHOWN OTHERWISE.
  - PIPE DISTANCES SHOWN ARE TO CENTRES OF MANHOLES.
  - STORMWATER LEAD INVERT AND HOUSE CONNECTION LOCATION INFORMATION HAVE BEEN SUPPLIED BY EARTHO CIVIL LTD.
  - ALL CONCRETE PIPES WERE MANUFACTURED BY HUPES AND BEDDED ON GAP 20.
  - ALL UPVC PIPES MANUFACTURED BY IPLEX PIPELINES AND BEDDED GAP 7.
  - ALL PIPELINE UNDERCUTS BACKFILLED WITH A MIXTURE OF HARDPCL 100 AND GAP 45.
  - ALL OUTLET STRUCTURES ARE CAST IN-SITU WHIRLWALL OUTFALLS WITH BAFFLES AND ROCK RIP RAP SET IN CONCRETE.
  - ALL STORMWATER RETICULATION WORKS WERE CARRIED OUT BY EARTHO CIVIL LTD DURING JANUARY - NOVEMBER 2007.

FEATURE	EASTING	NORTHING	LID LEVEL	IL (OUT)	IL (IN)	IL (DN)	IL (UP)
OUTLET L1	280917.17	608018.80		24.08 400w			
MH1.2	280321.52	608018.40	25.83	24.70 450w	24.80 225w	24.80 100w	
MH1.3	280321.11	608036.37	25.15	25.03 225w	25.08 225w		
MH1.4	280326.13	608006.14	27.40	25.43 225w	25.48 225w	25.95 100w	
MH1.5	280323.30	608003.87	27.59	26.84 225w	26.91 225w		
MH1.6	280342.44	608001.31	28.08	26.54 225w	26.71 100w		
MH1.M1	280327.89	608000.83	26.30	26.08 400w	26.10 400w	26.14 100w	
MH1.M2	280301.82	608022.83	26.88	26.35 400w	26.38 375w	27.11 100w	26.31 375w
MH1.M3	280281.72	608008.85	26.28	26.42 375w	27.08 100w	27.98 100w	26.47 375w
MH1.M4	280376.13	608071.78	26.81	26.83 375w	26.91 225w	26.94 100w	
MH1.M5	280367.82	608071.82	26.81	27.08 225w	26.08 100w		
EXD MH1.U1	280364.83	608078.74	26.81	27.84 400w	27.73 400w		
DCPS	280306.27	608077.40	26.84	26.11 225w			
CP11	280358.86	608028.42	26.83	27.79 300w			
C11 OUTLET	280367.74	608030.14		27.77 300w			

**COORDINATE SCHEDULE**

ITEM	EASTING	NORTHING	HEIGHT	ITEM	EASTING	NORTHING	HEIGHT	ITEM	EASTING	NORTHING	HEIGHT
PT1	280350.01	608030.80	27.30	PT8	280350.80	608079.81	27.85	PT9	280367.71	608030.33	27.11
PT2	280350.11	608030.80	27.37	PT9	280367.48	608079.71	27.85	PT10	280367.80	608078.18	26.78
PT3	280370.39	608077.83	26.96	PT10	280367.18	608078.81	27.28	PT11	280369.80	608077.88	26.75
PT4	280370.78	608078.11	27.80	PT11	280358.24	608078.18	27.30	PT12	280367.89	608030.32	27.33



DRAWING REVISION				DATE		INITIAL	
REV	DATE	DESCRIPTION	DRAWN	CHECK	SURVEYED	DRAWN	ROC

APPROVED: \_\_\_\_\_

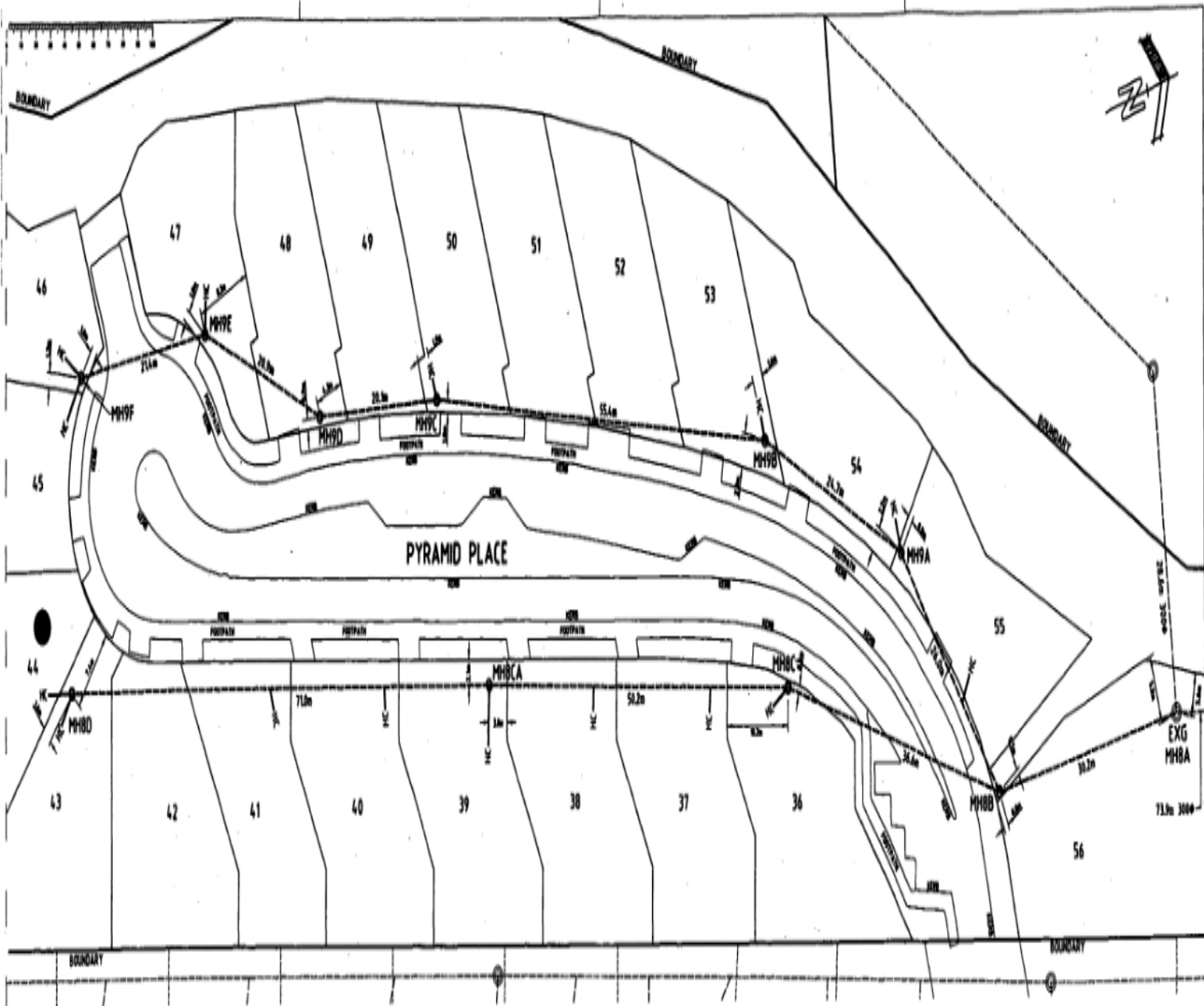
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CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

DRAWING TITLE  
**STORMWATER  
AS BUILT PLAN  
STAGE 2**

SCALE (A1)  
**1:250**

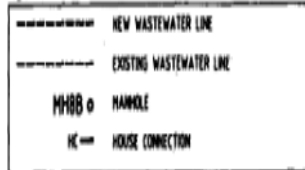
JOB NUMBER	DRAWING NUMBER	REVISION
42608	AB08	



#### NOTES

- LEVELS ARE IN TERMS OF LANDS AND SURVEY (AUCKLAND) DATUM 1946.
- COORDINATES ARE IN TERMS OF GEODETIC DATUM 1949.
- ALL WASTEWATER PIPES ARE 150mm UPVC SH16 UNLESS SHOWN OTHERWISE.
- ALL MANHOLES ARE 150mm UNLESS SHOWN OTHERWISE. ALL MANHOLES WERE MANUFACTURED BY HAPES.
- ALL HOUSE CONNECTIONS ARE 100mm UPVC SH16 UNLESS SHOWN OTHERWISE.
- PIPE DISTANCES SHOWN ARE TO CENTRES OF MANHOLES.
- ALL UPVC PIPES AND NEW MANHOLE CONNECTORS WERE MANUFACTURED BY IPLEX PIPELINES AND BECKED ON SAP 1.
- ALL PIPELINE UNDERCUTS BACKFILLED WITH A MIXTURE OF HARDFILL 90 AND GAP 45.
- WASTEWATER LEAD INVERT AND HOUSE CONNECTION LOCATION INFORMATION HAVE BEEN SUPPLIED BY EARTHCO CIVIL LIMITED.
- ALL WASTEWATER RETICULATION WORKS WERE CARRIED OUT BY EARTHCO CIVIL LTD DURING JANUARY - NOVEMBER 2007.

#### KEY



I HOEL STUART LUXFORD, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THE WASTEWATER RETICULATION POSITIONS, SCHEDULE OF COORDINATES, LID LEVELS, DIMENSIONS AND PIPE SIZES ARE CORRECT AND THAT THE INFORMATION IS ACCURATE TO WITHIN NORMAL ENGINEERING AND SURVEY TOLERANCES.

DATE:

H. S. LUXFORD  
CHARTERED PROFESSIONAL ENGINEER

FEATURE	EASTING	NORTHING	LID LEVEL	IL (OUT)	IL (IN)	IL (IN)	IL (IN)
EXD MH 6A	284410.44	698781.83	28.01	23.86 300m	24.36 100m	24.32 100m	23.88 300m
MH 6B	284408.14	698781.80	28.32	25.36 150m	25.43 150m	25.39 150m	
MH 6C	284391.86	698719.31	28.73	26.48 100m	26.84 100m	26.54 150m	
MH 6CA	284378.70	698870.86	28.77	27.21 150m	27.31 100m	27.28 150m	
MH 6D	284381.23	698901.84	28.44	27.05 150m	28.02 100m	27.99 100m	
MH 6A	284385.89	698740.46	28.08	25.57 150m	25.59 150m	25.72 100m	
MH 6B	284370.81	698720.74	28.21	25.78 150m	25.80 150m	25.94 100m	
MH 6C	284353.48	698688.12	28.08	26.12 150m	26.18 150m	26.28 100m	
MH 6D	284349.76	698648.33	27.78	26.32 150m	26.36 150m	26.40 100m	
MH 6E	284338.15	698630.92	27.83	26.53 150m	26.55 150m	26.62 100m	
MH 6F	284336.21	698620.80	27.92	26.71 150m	26.78 100m	26.73 100m	



REV	DATE	DESCRIPTION	DRAWN	CHECK

DATE	INITIAL
DESIGNED JAN 2008	HCK
DRAWN JAN 2008	MSD
CHECKED JAN 2008	FK
APPROVED	

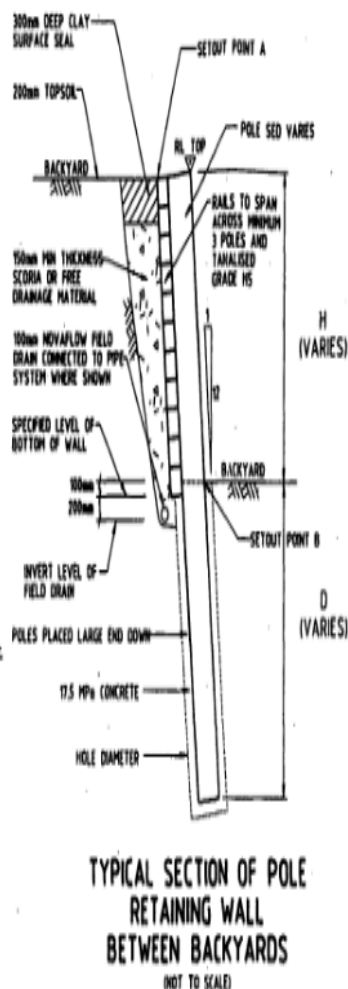
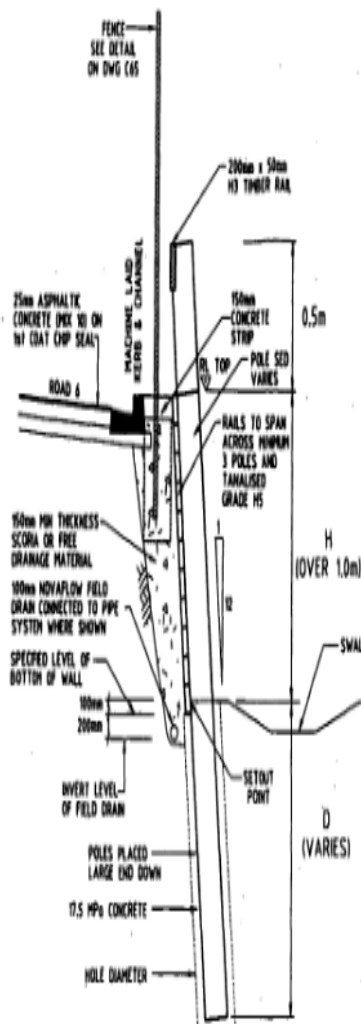
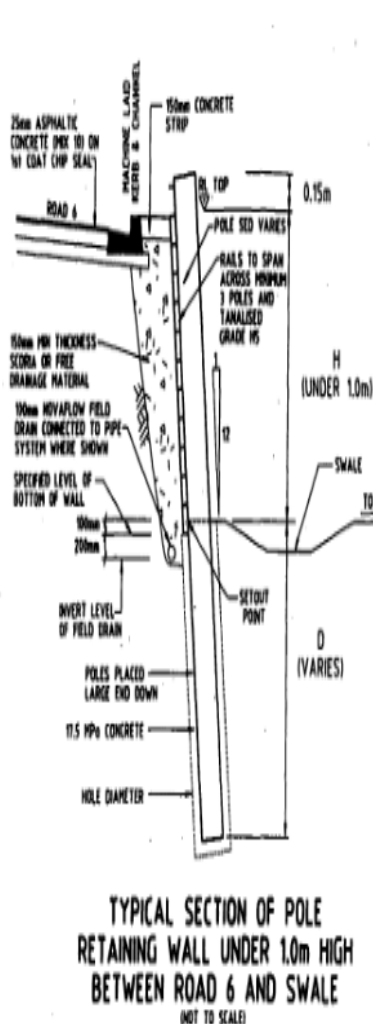
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CLIENT / PROJECT  
WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

DRAWING TITLE  
WASTEWATER  
AS BUILT PLAN  
STAGE 2

SCALE (A1)  
1:250





**NOTES:**

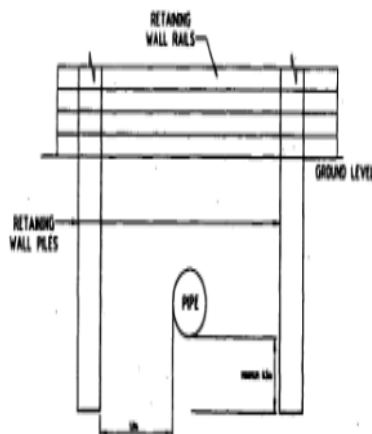
1. ALL WORKS TO COMPLY WITH WAIKARE CITY COUNCIL STANDARDS.
2. ALL RETAINING WALL POLES TO BE HIGH DENSITY.
3. FINAL LOCATION OF RETAINING WALLS TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.
4. RETAINING WALL LONGITUDINAL - BOTTOM OF WALL LEVELS ARE FINISHED PAYMENT/GROUND LEVEL.
5. ALL TIMBER POLE RETAINING WALLS ARE TYPE A EXCEPT RETAINING WALL 50, WHICH IS TYPE B.
6. ALL PILE HOLES ARE TO BE PREDRILLED.

**TYPE A (NO SURCHARGE)**  
(ALL POLE RETAINING WALLS EXCEPT RETAINING WALL 50)

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-1.00	100	300	1.0	1.0	45
1.00-1.50	150	350	1.0	1.5	45
1.50-2.00	200	400	1.0	2.0	45
2.00-2.50	250	450	1.0	2.5	90
2.50-3.00	300	500	1.0	3.0	90
3.00-3.50	350	600	1.0	3.5	90

**TYPE B (50% SURCHARGE) (POLE RETAINING WALL 50)**

MAXIMUM RETAINED HEIGHT (m)	POLE SIZE (mm)	HOLE DIAMETER (mm)	POLE SPACING (m)	EMBEDMENT DEPTH (m)	RAIL THICKNESS (mm)
0.00-0.50	100	300	1.0	1.0	45
0.50-1.00	150	350	1.0	1.5	45
1.00-1.50	200	400	1.0	2.0	45
1.50-2.00	250	450	1.0	2.5	90
2.00-2.50	300	500	1.0	3.0	90



**NOTE:**

- SETOUT POINT A - SET OUT POINT BETWEEN HOUSE LOT BOUNDARIES  
SETOUT POINT B - SET OUT POINT BETWEEN HOUSE LOT BOUNDARY AND ROAD RESERVE



100 FARMHOUSE STREET  
PO BOX 327  
AUCKLAND 1 • NEW ZEALAND  
PHONE 09-274 8888 • FAX 09-274 1170  
info@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**RETAINING WALL DETAILS**

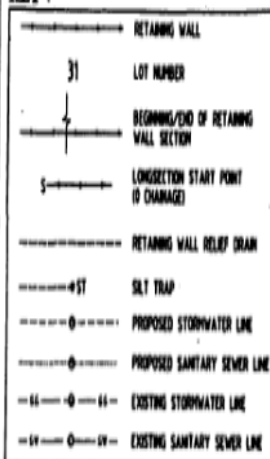
DESIGNED	DATE	INITIAL
DRAWN	16.07.08	CH
CHECKED		
APPROVED		

SCALE (A1)

**NTS**

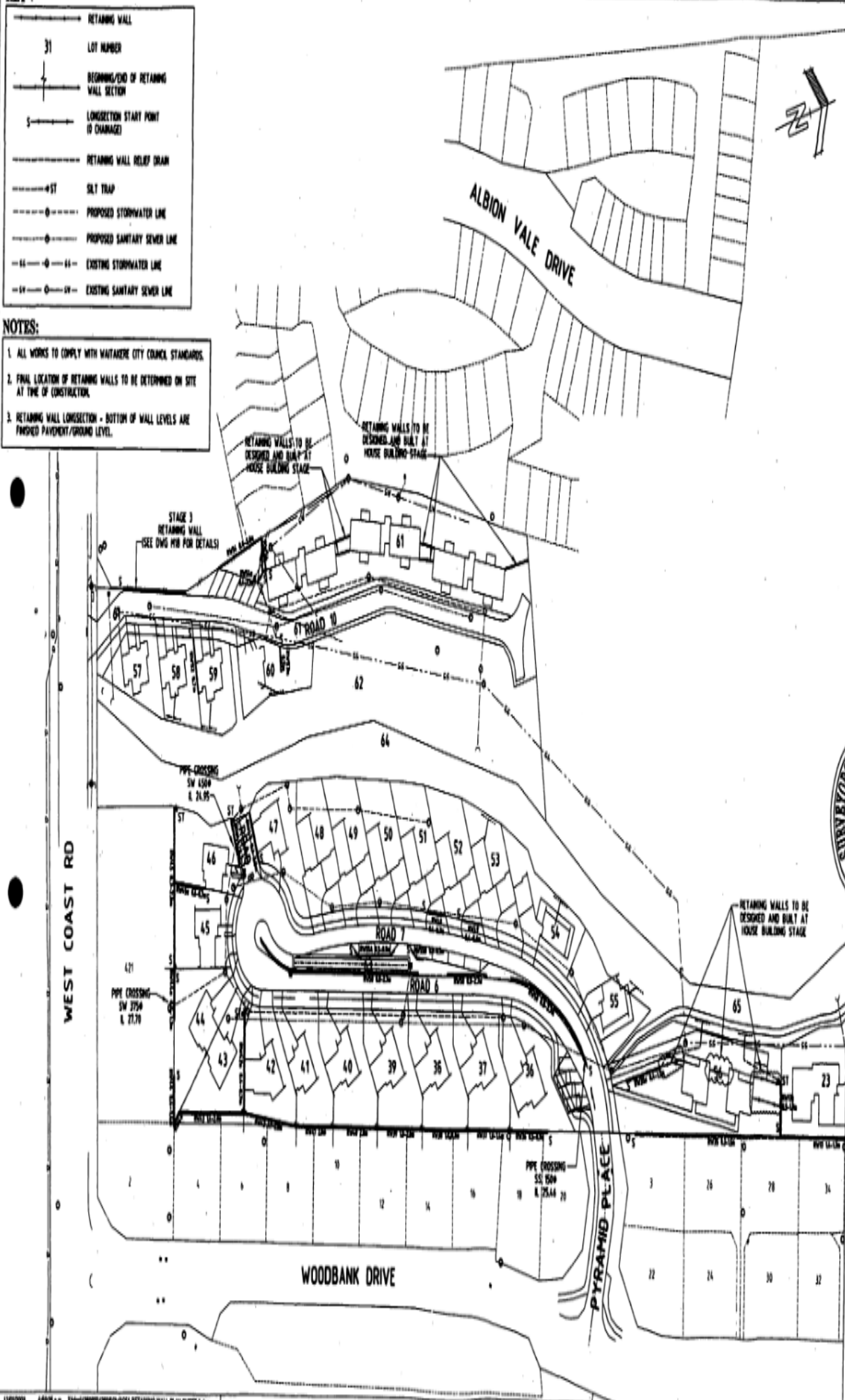
JAN HAMER	DRAWING NUMBER	REVISION
42608	<b>C52</b>	G

KEY



## NOTES:

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL STANDARDS.
2. FINAL LOCATION OF RETAINING WALLS TO BE DETERMINED ON SITE AT TIME OF CONSTRUCTION.
3. RETAINING WALL LONGSECTION - BOTTOM OF WALL LEVELS ARE FINISHED PAVEMENT/GROUND LEVEL.



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DRAWING NOTES

REV	DATE	DESCRIPTION	BY	CHECK
E	27/06/2006	STAGE 3 REV ADDED	FE	NOL
D	14/07/2006	STAGE 3 REV ADDED	FE	NOL
C	14/07/2006	STAGE 3 REV ADDED	FE	NOL
B	14/07/2006	STAGE 3 REV ADDED	FE	NOL
A	14/07/2006	STAGE 3 REV ADDED	FE	NOL
REV	DATE	DESCRIPTION	BY	CHECK

DRAWING REVISIONS



CLIENT / PROJECT

WEST COAST ROAD  
 HOUSING DEVELOPMENT  
 FOR  
 NZ HOUSING FOUNDATION

DRAWING TITLE  
 RETAINING WALL  
 PLAN  
 (SHEET 2)

REVISION	DATE	INITIAL
DESIGNED	JUNE 2006	FE
DRAWN	JUNE 2006	FE
CHECKED		
APPROVED		

SCALE (A1)  
 1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42303	C51	E

## **APPENDIX B**

**Fill Test Result Summary  
Settlement Marker Records**

Job Number: 42608/GE		Project: 423 - 429 West Coast Road, Henderson				FILL TEST RESULT SUMMARY			
Test No.	Test Date (Report No.)	Bulk Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Moisture Content (%)	Air Voids (%)	Field Shear Strength (kPa)	Relative Compaction (%)	Pass / Fail	Comments
1	11/12/06	1.892	1.52	24.0	6.2	4 X UTP	-	pass	Testing of crossing over gas pipeline easement.
2	(DFT1)	1.886	1.52	23.6	6.8	4 X UTP	-	pass	
3	15/1/07 (DFT2)	1.826	1.42	28.4	6.3	124, 134, 163, >225	-	pass	
4		1.785	1.32	35.1	4.1	121, 124, 141, 173	-	pass	
5		1.845	1.46	26.7	6.6	134, 140, 148, 148	-	pass	
6		1.819	1.26	44.7	0	111, 114, 121, 124	-	pass	
7	17/1/07	1.772	1.32	35.0	4.9	124, 139, 194, UTP	-	pass	
8	(DFT3)	1.853	1.46	26.9	6.0	226, 3 X UTP	-	pass	
9	23/1/07 (DFT4)	1.836	1.42	29.7	4.9	102, 137, 2 X >225	-	pass	
10		1.816	1.28	42.0	0	127, 198, 204, >225	-	pass	
11		1.725	1.20	44.2	2.3	134, 156, 163, 211	99	pass	
12		1.977	1.64	20.9	4.6	4 X >225	-	pass	
13		1.812	1.34	36.3	2.0	137, 148, 151, 182	100	pass	
14		1.804	1.34	34.4	3.6	121, 124, 137, 148	-	pass	
15		1.844	1.32	40.7	0	124, 131, 132, 148	-	pass	
16	26/1/07 (DFT5)	1.822	1.34	35.2	2.1	127, 191, 2 X >225	-	pass	
17		1.763	1.24	43.2	0.7	126, 143, 160, 211	100	pass	
18		1.850	1.38	33.8	1.5	131, 140, 148, 163	-	pass	
19		1.858	1.42	30.2	3.5	131, 140, 188, 194	-	pass	
20		1.788	1.28	40.8	0.6	102, 102, 114, 114	-	pass	
21	1/2/07 (DFT6)	1.904	1.48	29.6	1.5	127, 134, 140, 179	100	pass	
22		1.812	1.48	29.0	1.5	102, 151, 159, 163	-	pass	
23		1.897	1.48	28.9	2.4	111, 143, 163, 194	-	pass	
24		1.882	1.48	27.3	4.3	131, 182, 207, >225	100	pass	
25		1.776	1.22	45.4	0	166, 191, 201, 213	-	pass	
26	19/2/07 (DFT7)	1.910	1.52	25.9	3.9	184, 3 X UTP	-	pass	
27		1.884	1.44	30.9	1.6	194, 3 X UTP	>100	pass	
28		1.883	1.50	25.6	5.5	121, 157, 2 X >225	-	pass	
29		1.892	1.40	35.4	0	157, 216, 2 X >225	-	pass	

Job Number: 42608/GE		Project: 423 - 429 West Coast Road, Henderson				FILL TEST RESULT SUMMARY			
Test No.	Test Date (Report No.)	Bulk Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Moisture Content (%)	Air Voids (%)	Field Shear Strength (kPa)	Relative Compaction (%)	Pass / Fail	Comments
30	27/4/07 (DFT8)	1.833	1.34	36.0	1.0	156, 163, 176, 213	-	pass	Backfilling of silt pond.
31		1.843	1.38	34.3	1.5	114, 114, 118, 127	-	pass	
32	12/03/08	HA	Fill to 1.5m	0.5m = >226kPa	1.0m = >226kPa	1.5m = 160kPa	2.0m = 126kPa		Check of fill in Lot 23 and 56 - shown as cut in earthworks plans, but some filling took place once area was trimmed. All reasonable show shear strength in fill materials
33		HA	Fill to 1.2m	0.5m = 210kPa	1.0m = 142kPa	1.5m = 137kPa			
34		HA	Fill to 1.2m	0.5m = >226kPa	1.0m = 174kPa	1.5m = 113kPa			
35		HA	Fill to 1.0m	0.5m = UTP	1.0m = >226kPa				

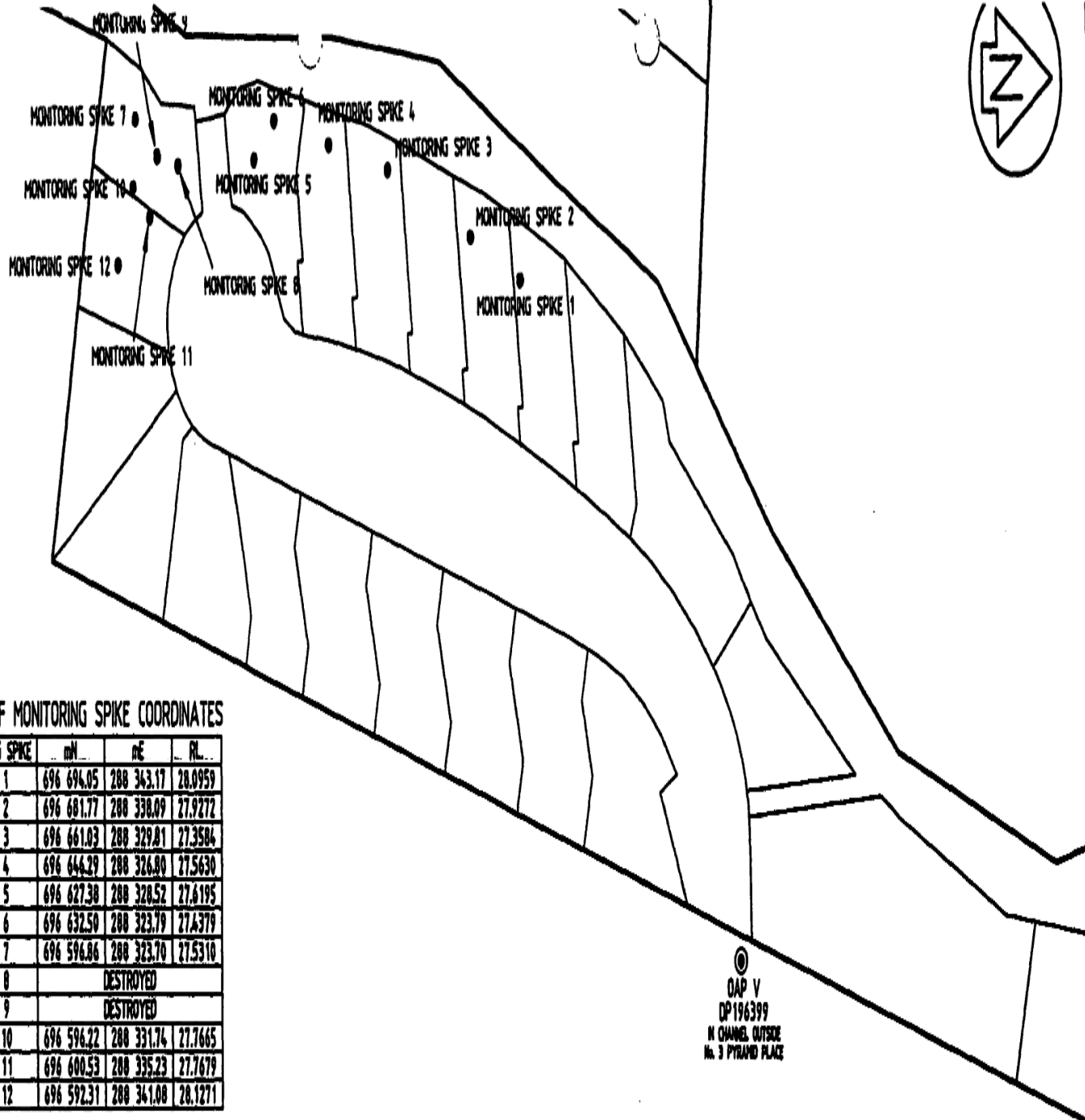


TABLE OF MONITORING SPIKE COORDINATES

MONITORING SPIKE	mN	mE	RL
SPIKE 1	696 694.05	288 363.17	28.0959
SPIKE 2	696 681.77	288 338.09	27.9272
SPIKE 3	696 661.03	288 329.81	27.3584
SPIKE 4	696 644.29	288 326.80	27.5630
SPIKE 5	696 627.38	288 328.52	27.6195
SPIKE 6	696 632.50	288 323.79	27.4379
SPIKE 7	696 596.86	288 323.70	27.5310
SPIKE 8	DESTROYED		
SPIKE 9	DESTROYED		
SPIKE 10	696 596.22	288 331.74	27.7665
SPIKE 11	696 600.53	288 335.23	27.7679
SPIKE 12	696 592.31	288 341.08	28.1271

DATE : 23rd NOVEMBER 2007

NOTES:

1. Datums: Hz - Mt Eden 1949  
Vt - Auckland 1949
2. Origin: Both Coordinate and Levels  
CRM IV DP196399
3. Spike Hz Coordinates have been established using GPS.
4. The level on CRM IV was established by a looped leveling run from SM 46 & SM 47 on West Coast Road
5. All spikes are 12mm dia. reinforcing bar 1m long, under plastic Toby boxes
6. RL's for the Monitoring Spikes are on the attached Excel file  
FILE: J:\CADD\DATA\ASIAN\ASIAN-MONITORING AND SURVEY.xls

CRM IV  
DP196399  
696 728.99 mN  
288 464.50 mE  
RL 32.50  
IN CHANNEL, OUTSIDE  
No. 3 PYRAMID PLACE

CRM IV  
DP196399  
696 728.99 mN  
288 464.50 mE  
RL 32.50  
IN CHANNEL, OUTSIDE  
No. 21 WOODBANK DRIVE

CRM VI  
DP196399  
IN CHANNEL, OUTSIDE  
No. 17 WOODBANK DRIVE

The copyright of this drawing remains the property of Babbage Consultants Ltd.

0 10 20 30 40 50 mm

FILE: J:\CADD\DATA\ASIAN\ASIAN-MONITORING AND SURVEY.xls

**Babbage**

BABBAGE CONSULTANTS LIMITED  
109 FANSHAW STREET, AUCKLAND  
PO BOX 2027, AUCKLAND 1, NEW ZEALAND  
PHONE 09 379 9980, FAX 09 377 1170

WEST COAST ROAD  
27th MARCH 2007

BY	DATE	CHK	DATE	TITLE	SCALE
DESIGNED				STAGE 2 FILL MONITORING SPIKE SETOUT	1:750
DRAWN					AT A3
APPROVED					REV
				200 1/4	
				42608	

**42608 - WEST COAST ROAD**  
STAGE 2 FILL MONITORING

**AS AT: 31<sup>st</sup> JULY 2007**

Monitoring Rod #	27 <sup>th</sup> March 2007	24 <sup>th</sup> April 2007	29 <sup>th</sup> June 2007	31 <sup>st</sup> July 2007	23 <sup>rd</sup> November 2007	$\Delta_1$	$\Delta_2$
	R.L.	R.L.	R.L.	R.L.		Difference from last month	Difference from beginning
1	28.1017	28.0988	28.1007	28.1000	28.0959	-0.0041	-0.0058
2	27.9291	27.9284	27.9297	27.9291	27.9270	-0.0021	-0.0021
3	27.3618	27.3598	27.3626	27.3616	27.3584	-0.0032	-0.0034
4	27.5707	27.5681	27.5685	27.5681	27.5630	-0.0031	-0.0077
5	27.6318	27.6284	27.6284	27.6258	27.6195	-0.0063	-0.0123
6	27.4514	27.4427	27.4448	27.4419	27.4379	-0.0040	-0.0135
7	27.5354	27.5301	27.5345	27.5339	27.5310	-0.0029	-0.0044
8	27.5920	27.5887	Destroyed			Destroyed	Destroyed
9	27.6668	27.6628	Destroyed			Destroyed	Destroyed
10	27.8017	27.7982	27.8014	27.8009	27.7685	-0.0344 *	-0.0362
11	27.7748	27.7724	27.7738	27.7729	27.7679	-0.0050	-0.0067
12	28.1300	28.1281	28.1308	28.1300	28.1271	-0.0029	-0.0029

SUSPECTED  
DISTURBANCE

## **Appendix 14**

### **Iwi Consultation**



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EMAIL: admin@babbage.co.nz

Te Kawerau a Maki Trust  
Private Bag 93109  
Henderson

Job Number: 42608  
MP  
23 June 2006

Attention: Saul Roberts

Dear Saul

Housing Development - West Coast Rd (No. 423-429), Henderson

New Zealand Housing Foundation are proposing to construct a residential development comprising 77 units at the above address.

The proposal will provide entry level, affordable housing options for families.

The proposal has been comprehensively designed and planned. The watercourse that runs through the site has been given particular attention. The application proposes to restore the riparian habitat of the watercourse margins with native plantings. Furthermore, we are proposing extensive sediment and erosion control and stormwater discharge measures to protect the water quality and "Mauri" of the watercourse.

Please refer to the Assessment of environmental effects attached for more detail.

We would appreciate your consideration and ultimately views on this development. We would be happy to meet you on site to walk you through the proposal.

Please do not hesitate to contact the undersigned on 027 283 8855.

Yours faithfully

**Matthew Paetz**  
**Senior Planner**  
**Babbage Consultants Limited**

MP24508

## **Appendix 13**

### **Geotechnical Assessment**

**Client:** NZ Housing Foundation

**Project:** West Coast Road Housing Development

**Job Number:** 42608

**Report Title:** Geotechnical Assessment

**Document Reference:** BDOC02880325

**Report Date:** June 2006

-	26/06/06	First Issue	R J Allison	M J D Stapleton
<b>Issue</b>	<b>Date</b>	<b>Status</b>	<b>Prepared By</b>	<b>Reviewed By</b>

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### **Appendix A: Drawings**

Site Location Plan	Drawing No. 42608/G01
Borehole Location Plan (Sheet 1)	Drawing No. 42608/G02
Borehole Location Plan (Sheet 2)	Drawing No. 42608/G03
Preliminary Cut and Fill Isopac Plan (Sheet 1)	Drawing No. 42608/G04
Preliminary Cut and Fill Isopac Plan (Sheet 2)	Drawing No. 42608/G05

### **Appendix B: Geotechnical Investigations**

Summaries of Soil Profile and Testing  
Explanation of Terms and Symbols

### **Appendix C: Laboratory Testing**

Geotechnical Test Reports

## **1.0 INTRODUCTION**

Babbage Consultants Ltd (Babbage) were appointed by NZ Housing Foundation to carry out a geotechnical investigation to support subdivision and earthworks consent applications for the proposed residential development at 423 to 429 West Coast Road, Glen Eden in Waitakere City.

This report presents the results of the geotechnical investigation and provides recommendations for the development of the site.

## **2.0 SITE DESCRIPTION**

### **2.1 LOCATION AND TOPOGRAPHY**

The site is located at 423-429 West Coast Road, Glen Eden in Waitakere City, as shown on the Site Location Plan in Appendix A.

The site covers an area of approximately 5.7 hectares and is bound to the south by West Coast Road and to the east by Woodbank Drive and associated residential development. Most of the western boundary is generally marked by Parrs Stream that flows northwards into the Waikumete Stream that flows approximately parallel to the northern boundary. However, in the south west the boundary extends westward of Parrs Stream to the existing residential development off Albionvale Road.

The site generally comprises rough grassland with areas of scrubby bush and exotic trees in the vicinity of the stream with small localised areas of thicker bush in the southern and northern parts of the site. A line of mature pine trees trend east west across the southern part of the site (between HA10 and 11). A stormwater pond is located in the south western part of the site to the west of Parrs Stream.

The land generally slopes gently downwards towards Parrs Stream. The existing ground levels in the southern part of the site reduce from approximately RL32m in the south east to approximately RL24m in the vicinity of the stream.

Over the southern and central part of the site the existing slope gradients are typically between 1(v) in 3.5(h) to 1(v) in 6(h).

In the northern part of the site the ground level generally reduces from approximately RL29m close to Titch Place on the eastern boundary to approximately RL18m adjacent to the northern boundary.

From the walkover survey there are no apparent signs of significant previous slope instability, although much of the site is heavily vegetated with grass and bush and therefore this may mask such features as shallow scarps.

## **2.2 AERIAL PHOTOGRAPHS**

To assess possible previous areas of fill placement on the site, aerial photographs from 1940, 1959 and 2001 were viewed. The photographs indicate the site has remained largely unchanged, with the exception of some minor residential development in the south eastern part of the site and the construction of the stormwater pond in approximately 2001. The residential development appears to have comprised a single dwelling in 1940 with additional outbuildings being evident in 1959. These buildings are not evident in 2001.

Minor areas of fill appear to have been placed in the vicinity of the eastern boundaries in the central and northern part of the site, associated with the construction of the residential dwellings along Woodbank Drive. Fill also appears to have been placed to form the eastern side of the existing stormwater pond.

No significant signs of instability were identified in the air photos reviewed for this report.

## **3.0 PROPOSED DEVELOPMENT**

The proposed development is for a residential subdivision of approximately 60 lots, to be constructed in three stages. Stage 1 includes the northern part of the site, Stage 2 the south eastern and Stage 3 the south western. In addition it is

proposed to relocate the existing stormwater pond in the south western part of the site and construct an additional stormwater pond in the north western corner of the site.

A footbridge is also to proposed to link the Stage 1 area to the land to the west of Parr's Stream.

A preliminary development layout is shown on the Borehole Location Plans in Appendix A.

The majority of the proposed residential dwellings are understood to comprise two storey structures, although Stage 3 is understood to comprise two and three storey structures with basement level parking although the parking space may not be enclosed.

Significant earthworks are to be carried out to develop the site to form a series of building platforms rising from the 100 year flood level adjacent to the stream. In Stage 1, preliminary earthworks design indicate cut depths of approximately 4.5m over the central part of the site and the placement of up to 1.5m of fill adjacent to the 100 year flood level along the margins of the stream.

In Stage 2, it is proposed to construct a significant fill platform above the 100 year flood level between a new access road and the stream. The proposed fill heights range from approximately 1.5m in the southern end to 3.0m in the northern end of the fill. Some cut of the land adjacent to the eastern boundary is proposed, with the depth of cut ranging from approximately 2.75m in the south east corner to 1m in the north west corner.

In Stage 3, maximum cut depths are anticipated to be approximately 2.5m with maximum fill heights of approximately 1.75m.

It is understood that no retaining structures are permitted to be constructed immediately adjacent to the flood plain and therefore fill batters are proposed along the 100 year flood level. Remote from the flood plain, retaining structures are proposed to support areas of cut and fill where significant changes in ground level occur between the various building platforms and access roads.

The preliminary earthworks plan is shown on Drawing No's 42608/G04 and G05 in Appendix A.

#### **4.0 SITE INVESTIGATION**

Following a detailed walkover of the site by our Senior Geotechnical Engineer the fieldwork was carried out between the 22<sup>nd</sup> and 25<sup>th</sup> May 2006 and comprised 23 hand auger boreholes to depths of between 0.8m and 3.15m below ground level, designated HA1 to HA23. The approximate location of the boreholes is shown on the Borehole Location Plan (Drawing No's 42608/G02 and G03) included in Appendix A.

Hand held shear vane tests were generally carried out at approximately 0.5m depth intervals within each borehole and remoulded samples taken at approximately 0.5m depth intervals. The material recovered from the boreholes was logged by a Babbage engineering geologist and the samples were returned to the Babbage Geotechnical Laboratory for inspection and possible testing. The results of the in situ testing and sampling are shown on the Summaries of Soil Profile and Testing in Appendix B.

#### **5.0 LABORATORY TESTING**

The following tests were carried out on samples recovered from the boreholes:

- Moisture Content                      67 No

The results of the above tests are presented on the Summaries of Soil Profile and Testing in Appendix B and in the Babbage Geotechnical Laboratory Report in Appendix C.

## **6.0 GEOLOGY AND STRATIGRAPHY**

### **6.1 GEOLOGY**

The IGNS's Geological Map of the Auckland Urban Area, 1:50,000, Sheet R11, 1992 indicates the geology at the site to generally comprise deposits of the Puketoka Formation comprising pumiceous muds, sands and gravels with muddy peat and lignite.

### **6.2 STRATIGRAPHY**

In general we consider the materials encountered in the boreholes are consistent with those indicated on the geological map. The ground conditions, as indicated in the boreholes, generally confirm the anticipated geology, and generally comprise a 0.1m to 0.8m thick layer of topsoil overlying stiff to very stiff clays interbedded with silt and sand horizons, frequently containing pumiceous material. Localised areas of fill approximately 0.6m to 0.8m in thickness were encountered in HA4 and HA14.

However, in the central and southern part of the site adjacent to the stream, the boreholes identify the presence of soft to firm clays containing organics (see HA3, 4, 7, 10, 11 and 12). These clays are generally highly plastic and range in colour from light brownish grey and orange to blue grey.

In HA20 and HA21, located adjacent to the stream where the proposed footbridge is to be located, the very stiff clay was underlain at approximately 1.0m and 0.8m respectively, by completely to highly weathered siltstone and sandstone. In HA22, in the north eastern part of the site, moderately weathered mudstone was encountered at 1.9m bgl.

## **7.0 GROUNDWATER CONDITIONS**

Groundwater seepages were recorded in all the boreholes, with the exception of HA4, HA20 and HA21 at depths of between 0.1m and 2.9m bgl during the fieldwork. In general and as anticipated, groundwater was encountered at

shallow depth in the boreholes located adjacent to the stream and at greater depths in the boreholes located on the higher ground.

## **8.0 DISCUSSION**

### **8.1 STABILITY**

From a review of aerial photographs and observations made during the walkover survey, there do not appear to be any signs of significant instability on the site.

From the preliminary earthworks plan (Drawing No's 42608/G04 and G05, included in Appendix A) it is apparent that the upper part of the existing slopes are to be generally cut and the areas immediately above the 100 year flood level filled to form building platforms for the proposed development. These earthworks will result in an overall reduction in the slope gradient and therefore, provided that good engineering practice is adopted, it is our opinion that the site is in general stable and suitable for the proposed development.

The fill embankments along the 100 year flood level, are however currently indicated to be 1(v) in 2(h) slopes. These slopes although only 2m to 3m high are however considered to be steeper than can be tolerated in a controlled fill batter in the long term at least on the soft foundation material detected in the southern part of the site. The presence of soft to firm materials extending beyond the depth of our investigations beneath a significant area of fill in our opinion requires further investigation to support the detailed engineering design. We anticipate that further investigations may recommend that either the outer fill slope be battered back to a shallower gradient or stabilised possibly in conjunction with improvement of the natural subgrade. For preliminary design purposes it is our opinion that side slopes formed from suitable clay fill are likely to remain stable at gradients no steeper than 1(v) to 3(h).

It is understood that retaining structures are not permitted adjacent to the 100 year flood level and therefore if 1(v) in 2(h) gradients are preferred, consideration could therefore be given to constructing the batters using

mechanical stabilisation techniques. Such reinforced slopes can be planted and if desired can be constructed at gradients steeper than 1(v) in 1(h). However, consideration has to be given to the placement of structures within the zone of reinforcement extending back from the face of the slope.

A range of retaining walls will be required to support both cuts and fills. The deeper cuts along the eastern boundary may require the use of walls designed to resist at rest earth pressures to prevent movement affecting adjoining houses on shallow foundations. Alternatively the walls could be constructed at flatter angles or moved away from the eastern boundary although both options would reduce the available fill. We consider the relative position of the existing dwellings along the eastern boundary will need to be confirmed by survey. We note the deepest cut of approximately 2.75m along the eastern boundary will create a subgrade close to the existing groundwater table. The wall type and the effect of construction techniques on soil strength as well as the desire of future owners to drain the area will need to be considered during detailed design.

## **8.2 EARTHWORKS**

As discussed in Section 3, significant earthworks are proposed on site to achieve the required platform levels for the proposed structures and access roads. The maximum depth of cut is approximately 4.5m in the central part of the Stage 1 area whilst the maximum thickness of fill is approximately 3.0m along the 100 year flood level in the Stage 2 area.

Whilst it is anticipated that most if not all of the localised areas of fill material detected on site will be removed during the surface strip and excavation for the benches, it is recommended that once the surface strip of topsoil and vegetation has been carried out and formation levels reached, the surface is inspected by a Geotechnical Engineer familiar with this report to confirm that no unsuitable material remains.

The results of the laboratory tests indicate the soils in areas of proposed cut have in situ moisture contents of between approximately 35% and 50%. We estimate the moisture contents are likely to be 5 – 10% above the plastic limit fo

the materials to be excavated. Therefore, it is anticipated that drying of the material will be required prior to reuse as fill.

We note that excavation in the vicinity of HA19 are likely to be affected by the presence of high moisture content silty sand beneath clay. The high moisture content sand, although apparently medium dense, is in our opinion likely to give rise to weaving and rutting under the repeated traffic movements of rubber tyred construction plant. Affected areas are likely to need over-excavation and recompaction or replacement with hardfill as appropriate.

In the case of the proposed fill batters to be constructed along the 100 year flood level, the placement of between 2m and 3m of fill will result in consolidation settlement of the underlying soils. The magnitude of this consolidation settlement and the rate at which it occurs will be largely controlled by the compressibility and permeability of the underlying soils. The findings of the boreholes indicate that in the Stage 1 area, the soils are likely to comprise stiff to very stiff sandy clays of moderate plasticity. However, in the Stage 2 area, the clays are indicated to be soft to firm, organic and of high plasticity.

Based on the above, it is our opinion that whilst consolidation settlement beneath the proposed fill batters in the Stage 1 area could be between 10mm and 20mm, assuming medium compressibility clays are present, in the Stage 2 area, where the clays are indicated to be highly compressible, consolidation settlement of between 100mm and 150mm may result beneath parts of the fill batters.

In order to minimise the effect of consolidation settlement on the proposed structures, we consider that the fill in the Stage 2 area should be placed during the initial stages of development and subsequent construction delayed for a minimum period of 6 months. The settlement of the fill could be monitored during this period to confirm the rate and amount of settlement taking place, thereby providing confidence in the assessment of likely settlement after development to ensure that it is within acceptable limits.

It should be noted that the above preliminary consolidation settlement values and time periods have been derived from assumed parameters. Additional

investigations will be required to more accurately assess the consolidation characteristics of the underlying soils for detailed design.

The placement of up to 3m of fill and any additional preload, on the soft to firm clays will require to be carried out under strict control in order to avoid potential bearing capacity failure of the underlying clays. The clay is indicated to have an undrained shear strength of 18kPa at 1m bgl in HA11 0.2m below the underside of topsoil in that location. We note this strength will not support conventional construction plant and the topsoil would require removal using a hydraulic excavator rather than a motorscraper. This soft to firm soil is susceptible to bearing capacity failure for applied bearing pressures in excess of approximately 35kPa. If the full height of fill is placed over a short period of time and no drainage is installed within the underlying clays, it is our opinion that localised bearing capacity failure of the soft to firm clays may occur.

In order to minimise the risk of bearing capacity failure beneath the fill batter it is recommended that additional vertical drainage is installed beneath the area of fill and the rate of filling is strictly controlled to permit the dissipation of excess pore pressures within the underlying clays. This may be achieved by installing vertical "wick" drains and a drainage blanket prior to filling. Alternatively, consideration may be given to installing stone columns instead of "wick" drains. These would have the advantage of providing additional vertical support to the fill batter.

Prior to the placement of fill it is expected that some form of subsoil drainage will be installed to ensure that groundwater seepage is not impeded by the placement of the fill, particularly behind the proposed retaining structures. In addition, based on the groundwater seepages encountered during the borings, groundwater may be encountered at shallow depth within cut areas and therefore adequate provision for drainage will require to be made in these areas.

It is recommended that all fill is certified where the thickness exceeds 0.6m or where structures or roads are to be located on the fill.

### 8.3 PAVEMENT

At the time of the investigation the cut and fill levels were not known and therefore no specific Scala penetrometer tests were carried out to assess the in situ CBR of the soil for the design of roads or car parking.

For the design of roads and car parking it is considered that a CBR value of 3 can be used for preliminary design for in situ soil and certified fill. It is however recommended that once the earthworks are complete, confirmatory Scala penetrometer tests are carried out to at least 0.5m depth below finished subgrade to confirm the preliminary design CBR value.

### 8.4 RETAINING WALLS

At the time of preparing this report, the details regarding the location and height of proposed retaining walls are not known.

For preliminary design of retaining walls with a horizontal ground surface above and below the wall it is considered that the following design parameters may be adopted for in situ soil or certified fill:-

Coefficient of active earth pressure	= 0.3
Coefficient of passive earth pressure	= 3.0
Coefficient of at rest earth pressure	= 0.5
Bulk unit weight	= 18 kN/m <sup>3</sup>

For pole retaining walls where undrained shear strength ( $c_u$ ) values are sometimes used for design it is considered that an unfactored  $c_u$  value of 60kPa may be adopted for preliminary design in insitu soil and 80kPa in certified fill. It is however recommended that for detailed design the  $c_u$  value is confirmed by a Geotechnical Engineer for the particular ground conditions along the line of the retaining wall. On this basis locally unfavourable ground conditions may be taken into account or the design value increased in favourable ground conditions.

It is noted that an existing sanitary sewer and stormwater line run parallel to the eastern boundary of the site and therefore the design of retaining walls in these

areas will require consider these services. In addition, the proximity of adjacent dwellings will also require consideration, especially where deep areas of cut are proposed.

## 8.5 FOUNDATIONS

Based on the findings of the investigation it is considered that the foundations for the proposed structures may be designed in accordance with NZS 3604:1999 "Timber Framed Buildings". This recommendation applies only to foundations within in situ soil or certified fill and no foundations should be founded in topsoil or uncertified fill.

In areas of proposed cut, the boreholes indicate the clays to be generally moderately plastic and therefore it is considered the foundations should be founded at least 450mm below finished ground level to take account of possible shrinkage swell affects. Where highly plastic clays occur, the founding depth should be increased to 600mm. We consider the founding depths should be confirmed following completion of the proposed earthworks.

In the case of structures located on the fill adjacent to the 100 year flood level, shallow foundations are likely to be constructed within certified fill. In order to minimise differential and total settlements as a result of the variation in thickness of the fill material, it is recommended that strict control is placed on the quality and compaction of the fill beneath the proposed structures. In addition, it is recommended that a serviceability limit state bearing strength of 100kPa is not exceeded for strip or pad foundations constructed within the fill material and that pad sizes should not exceed 1.0m x 1.0m in plan and strip foundations not exceed 1m width. Final development over the fill in the Stage 2 area will however be dependant on consolidation of the materials beneath the fill rather than the strength of the fill itself. Monitoring of the fill should confirm when development is appropriate.

It is understood that the proposed structures in Lots 54 and 55 are to be constructed on piled foundations that extend into the flood plain. As such, it is recommended that additional investigations are carried out in these areas to

determine the likely depth to which piles will require to be constructed to adequately support the structures.

## **8.6 FOOTBRIDGE**

The findings of boreholes AH20 and AH21 indicate the ground conditions in the vicinity of the proposed footbridge to comprise very stiff clay overlying siltstone / sandstone at between 0.8m and 1.0m bgl. As such, it is considered the abutments may be constructed within the very stiff clays or underlying siltstone / sandstone and designed for a serviceability limit state bearing strength of 100kPa.

It is recommended that flood levels and potential scour are considered when carrying out detailed design of the abutments and superstructure.

## **8.7 STORMWATER PONDS**

It is understood that the existing stormwater pond in the Stage 3 area is to be relocated approximately 20m to 30m to the north east. Details of the proposed pond construction are not known at this stage, although it is anticipated that the eastern part of the pond is likely to be formed from clay fill, similar to the existing.

The findings of borehole AH5 indicate the ground conditions in this area to comprise low permeability clays and clayey silts. Groundwater was indicated to be at approximately 2m bgl, although no long term monitoring was carried out. Therefore, it is considered the base of the proposed pond is likely to be formed within low permeability materials and require little reworking to form an adequate seal. Where areas of higher permeability materials are encountered, it is recommended that low permeability clay fill is placed and compacted to form a suitable seal. For preliminary design purposes, it is recommended that external side slopes to earth bunds are constructed at gradients no steeper than 1(v) in 3(h).

In the case of the proposed stormwater pond in the Stage 1 area, the findings of borehole AH23 indicate the presence of sands from 0.85m to 1.80m bgl

overlying alternating clay and sand horizons. Groundwater was indicated to be at 1.2m bgl, although no long term monitoring was carried out.

Whilst details of the proposed stormwater pond are not known at this stage, it is anticipated that the sides and base may be within soils that are too permeable to provide suitable retention of water. As such, it is considered that for preliminary design purposes an allowance is made to form a low permeability liner. This may be constructed from low permeability clay or by using a suitable geotextile. It is recommended that external side slopes to earth bunds are constructed at gradients no steeper than 1(v) in 3(h).

## **9.0 CONCLUSIONS**

Based on the fieldwork covered by this investigation it is considered that the site is suitable for residential subdivision in accordance with the proposed earthworks and subject to the recommendations contained within this report.

## **10.0 RECOMMENDATIONS**

- 10.1** It is recommended that an additional geotechnical investigation is carried out to support detailed design of the earthworks to provide further site specific information on the consolidation characteristics of the soils in the vicinity of the proposed fill batter along the 100 year flood level.
- 10.2** It is recommended that fill slopes on soft foundation soils do not exceed 1(v) in 3(h) unless suitably reinforced/mechanically stabilised.
- 10.3** It is recommended that all fill be certified beneath areas where development takes place (e.g. beneath buildings, roads etc). In the case of the fill along the 100 year flood level in Stage 2, it is recommended that development be postponed for at least 6 months after the fill has been placed in order to permit resulting consolidation settlement of the underlying clays. In order to increase the rate of consolidation settlement and minimise the risk of bearing capacity failure beneath the fill batter it is recommended that additional vertical drainage

is installed beneath the area of fill and the rate of filling is strictly controlled to permit the dissipation of excess pore pressures within the underlying clays.

- 10.4** It is recommended that subsoil drainage is installed beneath areas of fill and in particular to the rear of retaining structures. In addition, the results of the groundwater monitoring indicate that groundwater may be encountered at shallow depth within cut areas and therefore adequate provision for drainage will require to be made in these areas.
- 10.5** For road and car park design it is recommended that a CBR of 3 for the insitu soil and certified fill be used for preliminary design. Once the earthworks are complete it is recommended that confirmatory Scala penetrometer tests are carried out along the proposed roads and car park areas to confirm the design CBR value.
- 10.6** For retaining wall design it is recommended that the following design parameters are adopted for the insitu soils and certified fill for the case of horizontal ground surface above and below the wall.
- |                                       |                        |
|---------------------------------------|------------------------|
| Coefficient of active earth pressure  | = 0.3                  |
| Coefficient of passive earth pressure | = 3.0                  |
| Coefficient of at rest earth pressure | = 0.5                  |
| Bulk unit weight                      | = 18 kN/m <sup>3</sup> |
- 10.7** For pole retaining walls designed using an undrained shear strength ( $c_u$ ) value for the soil below the retained height it is recommended that an unfactored  $c_u$  value of 60kPa is used for preliminary design in residual soil and 80kPa in certified fill. For detailed design it is recommended that the actual ground conditions at the retaining wall location are assessed by a Geotechnical Engineer to take into account possible strength variations across the site. The position the proposed cut along the eastern boundary relative to dwellings along Woodbank Drive should be determined by survey and taken into account in the detailed design.
- 10.8** It is recommended that the foundations for residential dwellings are designed in accordance with NZS 3604:1999, with the exception of those for Lots 54 and 55

and the two to three storey structures in Stage 3, where specific design will be required. It is recommended that a serviceability limit state bearing strength of 100kPa is not exceeded for strip or pad foundations constructed within the fill material and that pad sizes should not exceed 1.0m x 1.0m in plan and strip foundations not exceed 1m width. It is recommended that the foundations are founded at least 450mm below finished ground level to take into account possible shrinkage swell affects. Where highly plastic clay forms the founding material then this depth should be increased to 600mm.

- 10.4** It is recommended that for preliminary design, all external batter slopes to the proposed stormwater ponds are constructed at gradients no steeper than 1(v) in 3(h). In the case of the northernmost stormwater pond, it is recommended the design includes for the provision of a low permeability clay or geotextile liner.

## **11.0 LIMITATIONS**

### **11.1 RESTRICTION OF INTENDED PURPOSE**

This report has been prepared solely for the benefit of our client NZ Housing Foundation with respect to the proposed redevelopment of the site, as described in Section 3. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

### **11.2 LEGAL INTERPRETATION**

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate legal advice.

### **11.3 RELIABILITY OF INFORMATION**

Recommendations and opinions in this report are based on data from the boreholes described in Section 6 of this report. The nature and continuity of subsoil conditions away from the boreholes are inferred and it must be

appreciated that actual conditions could vary considerably from the assumed model.

During excavation and construction the site should be examined by a Geotechnical Engineer competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based upon this report.

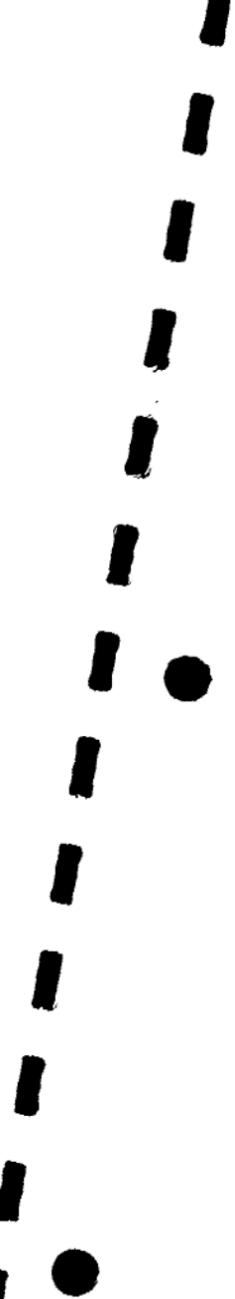
Babbage would be pleased to provide this service and believe that the project would benefit from such continuity. In any event, it is essential Babbage be advised if there is any variation in subsoil conditions from those described in the report as it may affect the design parameters recommended in the report.

This report has been prepared by Russell Allison and reviewed by Malcolm Stapleton.

Respectfully submitted  
**Babbage Consultants Limited**

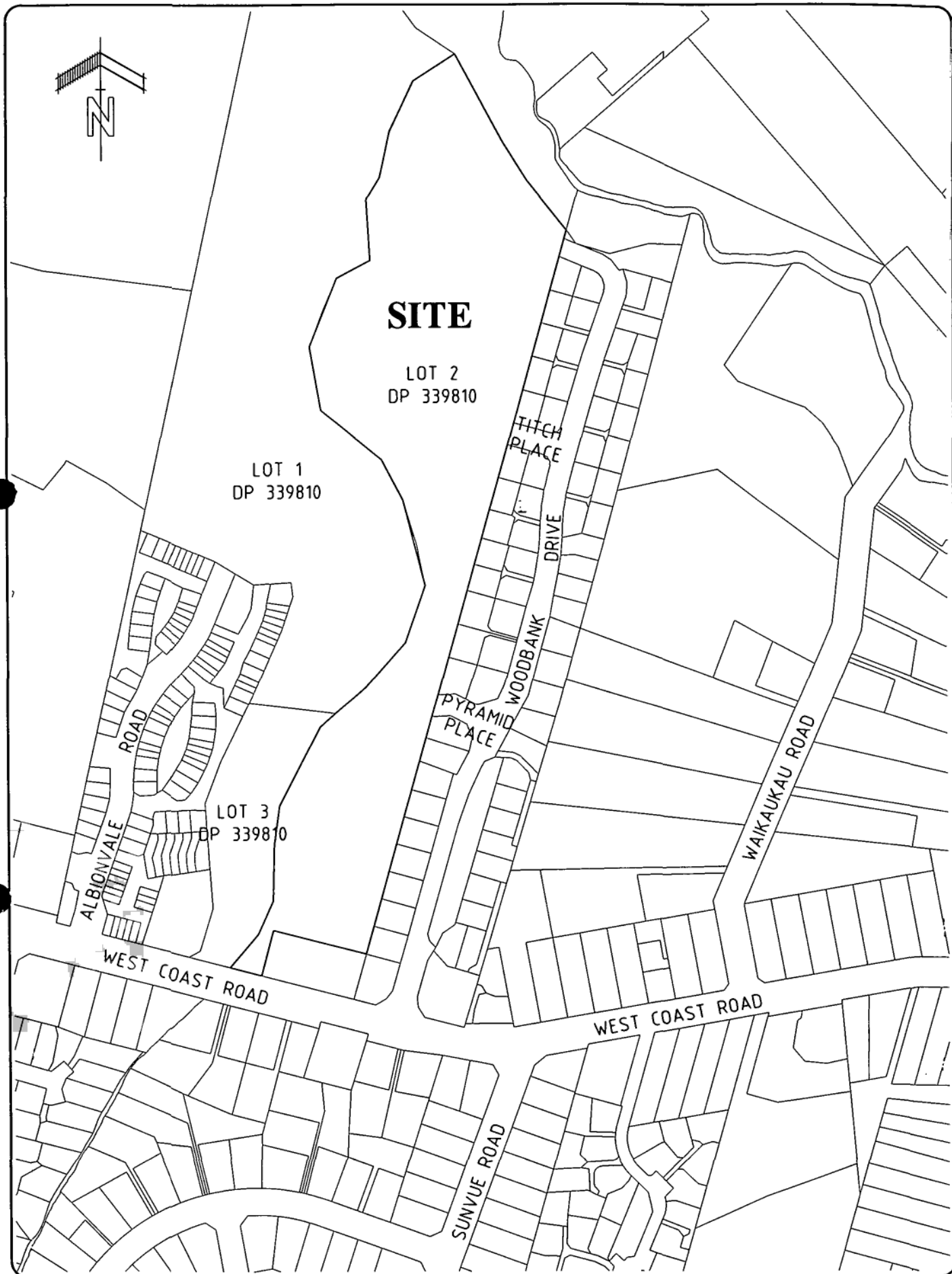
A handwritten signature in black ink, appearing to be 'R J Allison', written in a cursive style.

R J Allison  
**Senior Geotechnical Engineer**



**Appendix A**

**Drawings**



**WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION**

JOB NO:	42608
TITLE:	SITE LOCALITY PLAN
SCALE:	NOT TO SCALE
DRAWING:	G01



	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EXISTING CESSPIT
	EXISTING STORMWATER PIPE
	EXISTING WASTEWATER PIPE
	EXISTING FENCELINE

AH21 HAND AUGER BOREHOLES BY  
 BAGGAGE CONSULTANTS MAY 2006

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.

[illegible]

CLIENT / PROJECT  
WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

DRAWING TITLE  
BOREHOLE  
LOCATION PLAN  
(SHEET 1)

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	GMB
CHECKED		
APPROVED		

SCALE (A1)  
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G02	-

# KEY

	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EXISTING CESSPIT
	EXISTING STORMWATER PIPE
	EXISTING WASTEWATER PIPE
	EXISTING FENCELINE
	AH7 HAND AUGER BOREHOLES BY BABBAGE CONSULTANTS MAY 2006

# NOTES

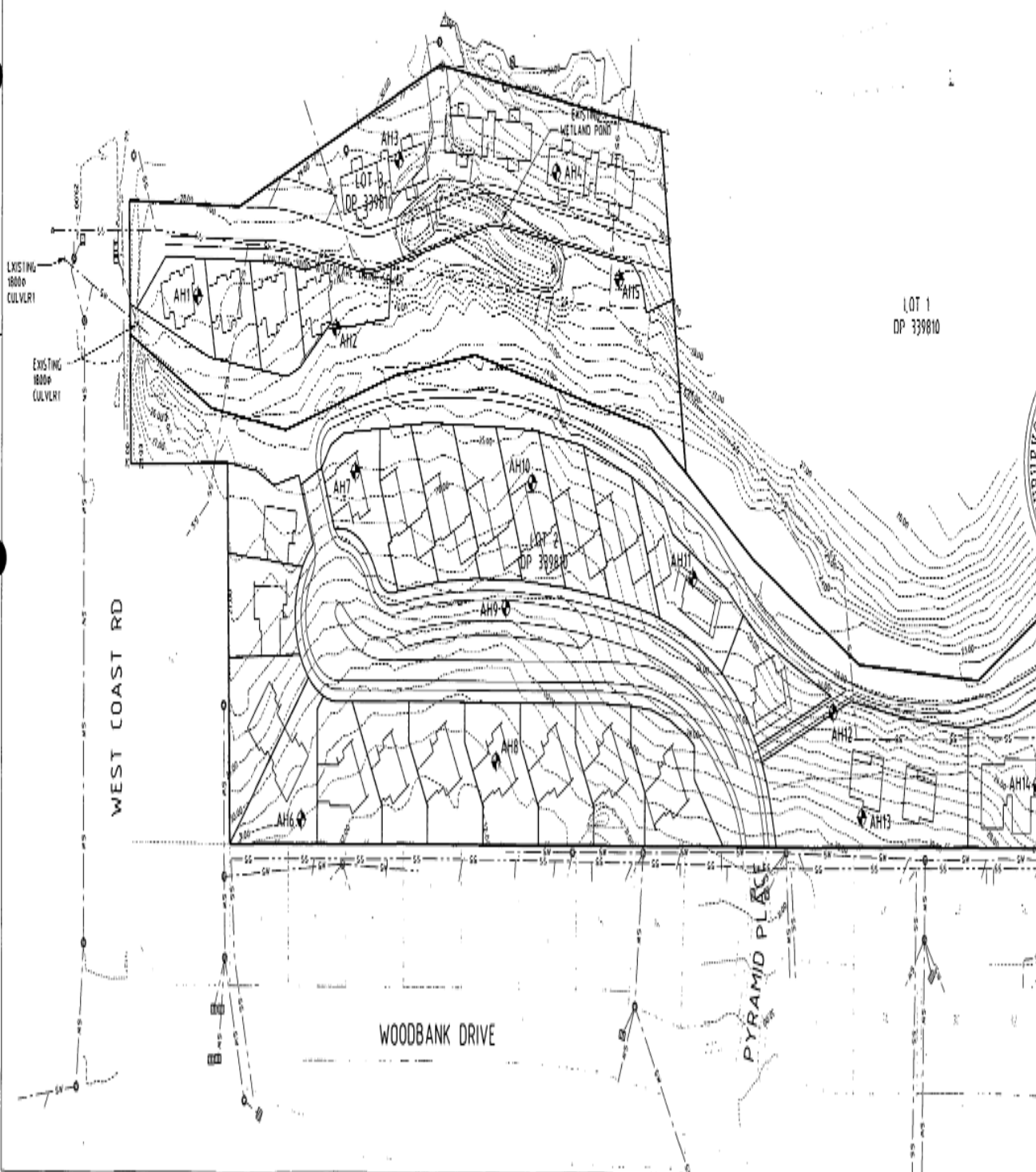
1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.

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DRAWING NOTES



ALBION VALE DRIVE



REV	DATE	DESCRIPTION	DRAWN	CHECK



102 FARMERS STREET  
PO BOX 3021  
AUCKLAND 1 - NEW ZEALAND  
PHONE (09) 379 9900 - FAX (09) 377 1170  
admin@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**BOREHOLE  
LOCATION PLAN  
(SHEET 2)**

DESIGNED	DATE	INITIAL
DRAWN	JUNE 2006	GMB
CHECKED		
APPROVED		

SCALE (A1)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G03	

# KEY

	BOUNDARY
	CUT CONTOURS
	FILL CONTOURS
	ZERO CUT/FILL
	EXTENT OF EARTHWORKS
	CALCULATED 100 YEAR FLOOD LEVEL
	EXISTING EASEMENT

## NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS
3. CONTOURS SHOWN ARE TO FINAL DESIGN LEVELS AND NOT TO SUBGRADE LEVELS

LOT 1  
DP 339810

CALCULATED 100 YEAR FLOOD LEVEL

DRAINAGE EASEMENT

GAS PIPELINE EASEMENT

TITCH PLACE

WOODBANK DRIVE

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

**Babbage**  
CONSULTANTS

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PHONE 09 - 379 8888 - FAX 09 - 377 1170  
abm@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**CUT AND FILL  
ISOPAC PLAN  
(SHEET 1)**

DESIGNED	DATE	INITIAL
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		

SCALE (A1)  
**1:500**

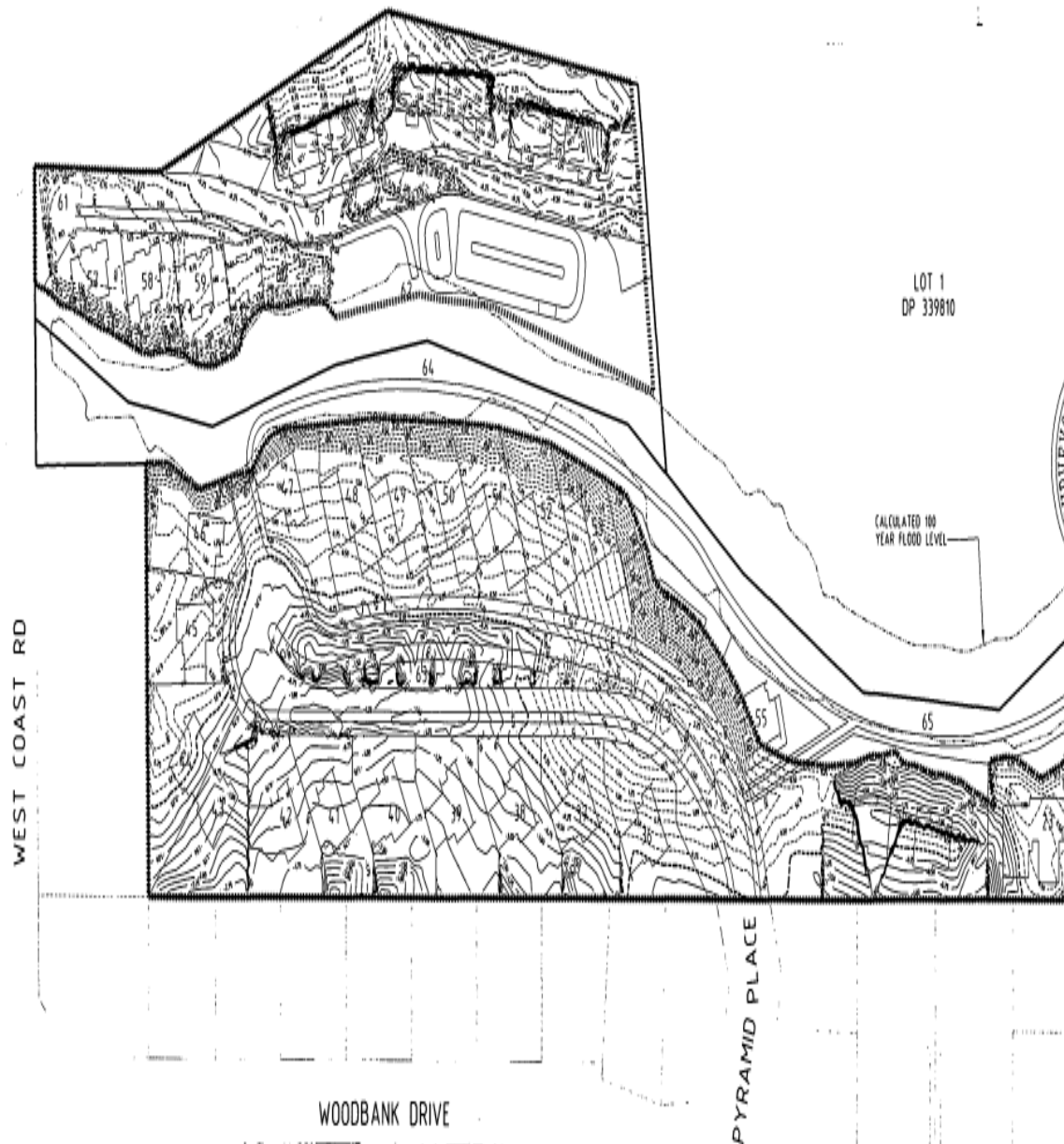
JOB NUMBER	DRAWING NUMBER	REVISION
42608	G04	

# KEY

	BOUNDARY
	CUT CONTOURS
	FILL CONTOURS
	ZERO CUT/FILL
	EXTENT OF EARTHWORKS
	CALCULATED 100 YEAR FLOOD LEVEL
	EXISTING EASEMENT

# NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
2. CONTOURS SHOWN ARE AT 0.25m INTERVALS
3. CONTOURS SHOWN ARE TO FINAL DESIGN LEVELS AND NOT TO SUBGRADE LEVELS



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

**Babbage**  
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ab@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**CUT AND FILL  
ISOPAC PLAN  
(SHEET 2)**


	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	GW
CHECKED		
APPROVED		


SCALE (M)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42608	G05	


## **Appendix B**


### **Geotechnical Investigations**

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608							
PROJECT: WEST COAST ROAD		HOLE No. HA1													
DATE STARTED: 25/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1									
DATE FINISHED: 25/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/GC									
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = + IN SITU VANE (kPa) = *			OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded  SPT / Scala Penetrometer		
										20	40	60			
0.40		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation												
0.70		CLAY: silty, fine sandy, very stiff, slightly plastic, light brown, moist			X	A1									>222kPa (U)
1.00		CLAY: very stiff, moderately plastic, light grey, moist			X	A2									181kPa (U) 68kPa (R)
		water seepage at 1.2m													
		firm, white pumice grains, occasional rootlets			X	A3	HA					*			83kPa (U) 69kPa (R)
2.00					X	A4						*			83kPa (U) 55kPa (R)
2.50		CLAY: silty, minor fine sandy, very stiff, moderately plastic, blueish grey		X	A5							*		158kPa (U) 62kPa (R)	
3.00		orange staining													
3.15		End of Borehole at 3.15 m			X	A6								>222kPa (U)	
Remarks:															


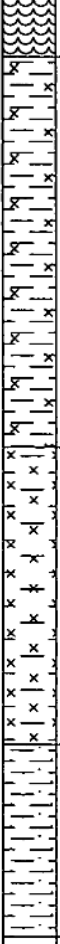
		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608							
PROJECT: WEST COAST ROAD		HOLE No. HA2													
DATE STARTED: 25/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1									
DATE FINISHED: 25/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/GC									
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = +			OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded SPT / Scala Penetrometer		
										IN SITU VANE (kPa) = ※ 20 40 60 50 100 150					
0.30		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation												
		CLAY: silty, stiff, moderately plastic, light brown grey mottled													
1.00															
1.20		black organic mottles													
1.50		grey with orange mottles, some organics													
2.00		water seepage at 2.0m													
2.40		SILT: sandy, some clay, stiff, moderately plastic, light grey with orange mottles, very moist													
3.00															
3.15		End of Borehole at 3.15 m													


Remarks:

		SUMMARY OF SOIL PROFILE & TESTING				JOB No. 42608						
PROJECT: WEST COAST ROAD		HOLE No. HA3										
DATE STARTED: 25/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1						
DATE FINISHED: 25/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/GC						
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS							
	SOIL SYMBOL	DATUM: Ground Surface SURFACE ELEVATION: <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●		OTHER TESTS
										LIMITS: PLASTIC = X LIQUID = +		
										20 40 60		
										IN SITU VANE (kPa) = *		SPT / Scala Penetrometer
0.30		TOPSOIL: Silt, firm, slightly plastic, dark brown										
1.00		CLAY: silty, very stiff, slightly to moderately plastic, light brown with orange mottles										134kPa (U) 69kPa (R)
1.30		minor fine sand, very stiff										107kPa (U) 62kPa (R)
		stiff, moderate to high plastic, light brown grey with orange streaks										75kPa (U) 18kPa (R)
		free water at 1.6m										79kPa (U) 34kPa (R)
2.60		pumiceous grains, sandy										117kPa (U) 34kPa (R)
3.00		soft to firm										31kPa (U) 18kPa (R)
3.15		End of Borehole at 3.15 m										
Remarks:												

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608							
		PROJECT: WEST COAST ROAD						HOLE No. HA4							
DATE STARTED: 25/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1									
DATE FINISHED: 25/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/GC									
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS		
										LIMITS: PLASTIC = X LIQUID = +					
										IN SITU VANE (kPa) = *					
										20	40	60			
										50	100	150			
		TOPSOIL: Silt, firm, slightly plastic, dark brown	FILL												
0.40		FILL: Silt, clay, stiff, moderately plastic, brown greys			X	A1									55kPa (U) 34kPa (R)
0.80		CLAY: silty, very stiff, moderately plastic, light brownish grey with orange streaks, rootlets, moist			X	A2									103kPa (U) 59kPa (R)
1.00					X	A3									109kPa (U) 62kPa (R)
2.00					X	A4									114kPa (U) 71kPa (R)
2.20					X	A5									95kPa (U) 65kPa (R)
2.40		pumiceous grains, sandy, stiff to very stiff, light grey with white flecks	Alluvium - Puketapu Formation												
2.60		slightly organic, blackish staining			X	A6									68kPa (U) 38kPa (R)
2.80		silty, stiff, moderately plastic, light brown with orange mottles													
3.00															
3.15		End of Borehole at 3.15 m													

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608				
PROJECT: WEST COAST ROAD		HOLE No. HA5										
DATE STARTED: 25/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1						
DATE FINISHED: 25/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/GC						
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS							
	SOIL SYMBOL	DATUM: Ground Surface SURFACE ELEVATION: <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = + IN SITU VANE (kPa) = ※ 50 100 150	OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded SPT / Scala Penetrometer	
0.20		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketaka Formation									
		CLAY: silty, very stiff, moderate to highly plastic, light brownish grey with orange mottles										
1.00		stiff, whiteish				A1	HA				122kPa (U) 68kPa (R)	
1.50						A2					97kPa (U) 49kPa (R)	
2.00		SILT: clayey, stiff, moderately plastic, light grey with orange mottles, white pumiceous grains				A3					95kPa (U) 62kPa (R)	
2.50		free water at 2.0m				A4					75kPa (U) 44kPa (R)	
3.00		CLAY: silty, minor fine sandy, stiff to very stiff, moderately plastic, light grey with orange mottles, wet, rootlets			A5					101kPa (U) 47kPa (R)		
3.15		End of Borehole at 3.15 m			A6					97kPa (U) 47kPa (R)		
Remarks:												

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608						
PROJECT: WEST COAST ROAD		HOLE No. HA6												
DATE STARTED: 23/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1								
DATE FINISHED: 23/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: CM/KF								
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = +			OTHER TESTS	
										IN SITU VANE (kPa) = *				
										20	40	60		
		TOPSOIL: Silt, firm, slightly plastic, dark brown												
0.40		CLAY: silty, very stiff, moderate to highly plastic, mottled mid grey orange	Alluvium - Puketaka Formation		X	A1							*	148kPa (U) 44kPa (R)
1.00		less orange staining, light brown			X	A2						●	*	148kPa (U) 65kPa (R)
2.00					X	A3	HA						*	129kPa (U) 67kPa (R)
2.30		free water at 2.1m			X	A4						*		110kPa (U) 57kPa (R)
2.60		sandy with dark brown (organic) mottles			X	A5						*		112kPa (U) 26kPa (R)
3.00		silty, fine sandy, moderate to high plastic, light grey with orange streaks			X	A6						*		109kPa (U) 42kPa (R)
3.15		End of Borehole at 3.15 m												

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA7

DATE STARTED: 23/05/2006

METHOD: HA

RIG: 50 dia Hand Auger

SHEET 1 of 1

DATE FINISHED: 23/05/2006

DRILLED BY: Babbage Consultants Ltd

FLUID: None

LOGGED BY: GC/SL

SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
DEPTH (m)	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +			OTHER TESTS	
										20	40	60	Corrected Shear Vane Result **	
										IN SITU VANE (kPa) = ✱			U = peak / R = remoulded	
										50	100	150	SPT / Scala Penetrometer	
		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketokai Formation											
0.45		CLAY: silty, stiff, moderate to highly plastic, grey with yellow mottles free water at 0.6m		⊗	A1							●		79kPa (U) 36kPa (R)
1.00		slightly silty, firm, high plastic, mid grey orange with white flecks		⊗	A2					✱		●		34kPa (U) 23kPa (R)
1.70		CLAY: sandy, firm, moderately plastic, blueish grey with numerous roots		⊗	A3	HA					✱	●		73kPa (U) 33kPa (R)
2.00				⊗	A4						✱		●	47kPa (U) 21kPa (R)
2.30		slightly decomposed wood fragments												
2.50		silty, firm, high plastic, blueish grey	⊗	A5						✱		●	34kPa (U) 18kPa (R)	
3.00														
3.15		End of Borehole at 3.15 m			⊗	A6				✱		●	31kPa (U) 18kPa (R)	
Remarks:														

Remarks:

<b>SUMMARY OF SOIL PROFILE &amp; TESTING</b>		JOB No.	<b>42608</b>
PROJECT:  <b>WEST COAST ROAD</b>		HOLE No.	<b>HA8</b>
METHOD: HA	RIG: 50 dia Hand Auger	SHEET 1 of 1	
DRILLED BY: Babbage Consultants Ltd	FLUID: None	LOGGED BY: GC/SL	

[illegible]

Remarks:



# SUMMARY OF SOIL PROFILE & TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA9

DATE STARTED: 23/05/2006

METHOD: HA

RIG: 50 dia Hand Auger

SHEET 1 of 1

DATE FINISHED: 23/05/2006


DRILLED BY: Babbage Consultants Ltd

FLUID: None

LOGGED BY: CM/KF

DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +			OTHER TESTS		
										IN SITU VANE (kPa) = *			Corrected Shear Vane Result **  U = peak / R = remoulded  SPT / Scala Penetrometer		
										20	40	60			
										50	100	150			
0.25		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation												
		CLAY: sandy, very stiff, moderately plastic, light grey yellow with dark brown streaks.													
					X	A1							*		109kPa (U) 40kPa (R)
1.00					X	A2						●		*	140kPa (U) 73kPa (R)
		increasing sand, white pumice flecks, very moist			X	A3	HA					●		*	123kPa (U) 63kPa (R)
2.00		Stiff.			X	A4						*	●		82kPa (U) 44kPa (R)
2.10		CLAY: minor sand, stiff, high plastic, light grey with orange streaks.													
2.50		organic stained band, dark brown grey			X	A5					*		●	77kPa (U) 35kPa (R)	
2.80		CLAY: minor sand, stiff, high plastic, light grey with orange streaks.													
3.00					X	A6					*		●	53kPa (U) 25kPa (R)	
3.15		End of Borehole at 3.15 m													

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No.		42608					
PROJECT:		WEST COAST ROAD						HOLE No.		HA10					
DATE STARTED: 23/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1									
DATE FINISHED: 23/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: GC/SL									
DEPTH (m)	SOIL/ROCK DESCRIPTION					SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface	SURFACE ELEVATION:	For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X    LIQUID = + IN SITU VANE (kPa) = *			OTHER TESTS
0.25		TOPSOIL: Silt, firm, slightly plastic, dark brown													
0.60		CLAY: silty, very stiff, moderately plastic, light grey with orange mottles, moist													148kPa (U) 62kPa (R)
1.00		SAND: clayey, (fine grained), medium dense, (very stiff), slightly to non plastic, light grey with orange mottles, moist													Unable to Penetrate
1.70		CLAY: silty, very stiff, moderately plastic, grey with orange mottles													120kPa (U) 68kPa (R)
2.00		stiff													73kPa (U) 31kPa (R)
2.40		very stiff, purple brown (organic stained)													109kPa (U) 68kPa (R)
2.70		ORGANIC CLAY, silty, firm, moderately plastic, dark grey and brown.													38kPa (U) 29kPa (R)
3.00															
3.15		End of Borehole at 3.15 m													

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA11

DATE STARTED: 23/05/2006

METHOD: HA

RIG: 50 dia Hand Auger

SHEET 1 of 1

DATE FINISHED: 23/05/2006


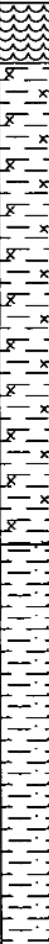
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FLUID: None

LOGGED BY: CM/KF

SOIL/ROCK DESCRIPTION		SAMPLES RECOVERED & TEST RESULTS													
DEPTH (m)	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS		
										LIMITS: PLASTIC = X      LIQUID = +					
										IN SITU VANE (kPa) = *					
										20	40	60			
50      100      150															
SPT / Scala Penetrometer															
		TOPSOIL/Organic SILT, very soft to soft, slightly plastic, dark brown, saturated - water from surface	Alluvium - Pukekohe Formation												
0.80															48kPa (U) 15kPa (R)
1.00		CLAY: silty, soft to firm, moderate to high plastic, light grey with brown mottles, some decomposed wood fragments													18kPa (U) 13kPa (R)
															35kPa (U) 18kPa (R)
2.00		becoming stiff, moderate to high plastic, blueish grey with brown rootlets													94kPa (U) 20kPa (R)
															109kPa (U) 26kPa (R)
3.00															63kPa (U) 22kPa (R)
3.15		End of Borehole at 3.15 m													

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING				JOB No. 42608									
PROJECT: WEST COAST ROAD		HOLE No. HA12													
DATE STARTED: 23/05/2006		METHOD: HA		RIG: 50 dia Hand Auger		SHEET 1 of 1									
DATE FINISHED: 23/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: SLWEC									
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●		OTHER TESTS			
										LIMITS: PLASTIC = X LIQUID = +					
										20	40	60	Corrected Shear Vane Result **  U = peak / R = remoulded  SPT / Scala Penetrometer		
										IN SITU VANE (kPa) = ✱					
										50	100	150			
0.20		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation												
		CLAY: silty, stiff, slight to moderately plastic, brown, rootlets													
		moderate to high plastic, yellow light grey, very moist from 0.4m		X	A1										94kPa (U) 47kPa (R)
		free water at 0.8													
1.00		soft to firm, moderate to high plastic, mid grey orange, saturated		X	A2										23kPa (U) 8kPa (R)
		blueish grey from 1.5m		X	A3	HA									24kPa (U) 12kPa (R)
1.80		CLAY: silty, minor fine sand, stiff, moderate to high plastic, blueish grey													
2.00															
3.00															
3.15		very stiff													
													134kPa (U) 49kPa (R)		
		End of Borehole at 3.15 m													

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA13

DATE STARTED: 22/05/2006

METHOD: HA

RIG: 50mm dia Auger

SHEET 1 of 1

DATE FINISHED: 22/05/2006






DRILLED BY: Babbage Consultants Ltd

FLUID: None







LOGGED BY: SL



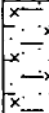
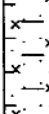
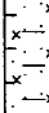
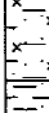
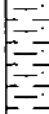
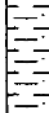
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS	
		SURFACE ELEVATION:								LIMITS: PLASTIC = X      LIQUID = +			Corrected Shear Vane Result **	
										IN SITU VANE (kPa) = ✱				
		For an explanation of the terms & symbols used see attached sheets.								20	40	60	U = peak / R = remoulded	
										50	100	150	SPT / Scala Penetrometer	
0.20		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation											
		CLAY: silty, very stiff, moderately plastic, yellowish grey brown with orange mottles, moist			X	A1					●		✱	170kPa (U) 95kPa (R)
0.80		CLAY: sandy (fine grained), very stiff, moderately plastic, light grey with yellow orange bands, some pumiceous grains, moist			X	A2					●		✱	170kPa (U) 87kPa (R)
1.00		CLAY: very stiff, moderate to highly plastic, whiteish light grey, pumiceous			X	A3	HA				●		✱	148kPa (U) 71kPa (R)
1.60		CLAY: very stiff, moderate to highly plastic, whiteish light grey, pumiceous	Waitemata Group		X	A4					●	✱		136kPa (U) 73kPa (R)
2.00		SAND: clayey, (fine grained), 'medium dense', (very stiff), slightly plastic, light to mid grey, moist			X	A5						✱	●	122kPa (U) 65kPa (R)
2.30		free water at 2.5m, (coarse grained)			X	A5								
2.80		CLAY: sandy, very stiff, moderately plastic, mid grey with orange mottles			X	A6						✱	●	103kPa (U) 60kPa (R)
3.00														
3.15		End of Borehole at 3.15 m												

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608						
PROJECT: WEST COAST ROAD		HOLE No. HA14												
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1								
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: GC/WEC								
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = +  IN SITU VANE (kPa) = ✱			OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded  SPT / Scala Penetrometer	
										20	40	60		
0.15		TOPSOIL: SILT, firm, slightly plastic, blackish dark brown, very wet	FILL											
0.60		CLAY: silty, very stiff, moderately plastic, mid grey with orange streaks												
0.80		Organic SILT: some clay, stiff, slightly plastic, dark brown, organic stained (Old Topsoil)?	ALLUVIUM - PUKETOKA FORMATION											
1.00		CLAY: silty, firm to stiff, moderately to highly plastic, brownish light grey with orange streaks.												
1.75		free water at 1.0m	ALLUVIUM - PUKETOKA FORMATION											
2.00		stiff, moderately plastic, brownish light grey.												
3.00		CLAY: silty, very stiff, moderately plastic, light to mid grey with orange stains	WAITEMATA GROUP											
3.15		End of Borehole at 3.15 m												

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No.		42608					
		PROJECT: WEST COAST ROAD						HOLE No.		HA15					
DATE STARTED: 22/05/2006		METHOD: HA			RIG: 50mm dia Auger			SHEET 1 of 1							
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd			FLUID: None			LOGGED BY: SL							
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS										
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +			OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded  SPT / Scala Penetrometer		
										IN SITU VANE (kPa) = *					
										20	40	60			
0.10		TOPSOIL: Silt, firm, slightly plastic, brown	FILL												
		SILT: minor clay, stiff, non plastic, light brown with grey bands, moist													
0.40		CLAY: silty, firm to stiff, moderately plastic, brown with orange mottles, moist, rootlets	ALUVIUM - Puketaka Formation		A1					*	●		68kPa (U) 18kPa (R)		
		becoming stiff to very stiff, light grey with orange bands										●	*	148kPa (U) 68kPa (R)	
1.00		very stiff, light to mid grey with orange mottles			A2										
		CLAY: some silt, some sand (fine grained), light grey with orange bands, moist			A3		HA						●	*	150kPa (U) 90kPa (R)
2.00			ALUVIUM - Puketaka Formation		A4						●	*	122kPa (U) 53kPa (R)		
2.50		CLAY: silty, stiff, slightly to moderately plastic, light brown - light grey with coarse silt grains free water	Waitemata Group		A5					*		●	92kPa (U) 76kPa (R)		
3.00			Waitemata Group		A6					*			20 ●	65kPa (U) 21kPa (R)	
3.15															
	End of Borehole at 3.15 m														
Remarks:															

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608				
		PROJECT: WEST COAST ROAD						HOLE No. HA16				
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1						
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: GC/WEC						
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS							
	SOIL SYMBOL	DATUM: Ground Surface SURFACE ELEVATION: <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = + IN SITU VANE (kPa) = * 50 100 150	OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded SPT / Scala Penetrometer	
0.40		TOPSOIL: Silt, firm, slightly plastic, dark brown, saturated  free water at 0.2m	Alluvium - Puketaka Formation									
		CLAY: silty, very stiff, moderately plastic, mottled mid grey orange  becoming sandy, (fine grained) at 0.75m			X	A1						118kPa (U) 16kPa (R)
1.00		CLAY: silty, fine sandy, very stiff, moderately plastic, light to mid grey with orange banding			X	A2						116kPa (U) 29kPa (R)
1.90		banded CLAY: silty, very stiff, moderately plastic, grey	Waitemata Group		X	A3	HA				*	184kPa (U) 57kPa (R)
2.00		SAND: clayey, 'medium dense to dense', slightly plastic, grey			X	A4						>190kPa (U)
					X	A5						>190kPa (U)
3.00					X	A6						Unable to Penetrate
3.15		End of Borehole at 3.15 m										

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA17

DATE STARTED: 22/05/2006

METHOD: HA

RIG: 50mm dia Auger

SHEET 1 of 1

DATE FINISHED: 22/05/2006



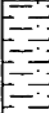
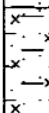
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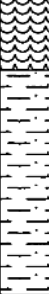

SOIL/ROCK DESCRIPTION		SAMPLES RECOVERED & TEST RESULTS															
DEPTH (m)	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = +  IN SITU VANE (kPa) = ✱						OTHER TESTS	
																Corrected Shear Vane Result **  U = peak / R = remoulded	
																SPT / Scala Penetrometer	
0.10		TOPSOIL: Silt, firm, slightly plastic, dark brown  CLAY: slightly silty, very stiff, moderately plastic, mottled mid grey orange	Alluvium - Puketoka Formation														
		sandy, very stiff, moderately plastic, light grey orange															128kPa (U) 66kPa (R)
1.00																	173kPa (U) 67kPa (R)
1.20		banded CLAY: silty, very stiff, moderately plastic, light to mid grey  and SAND: clayey, 'medium dense to dense', (fine grained), slightly plastic, mid grey	Waitemata Group														
																	140kPa (U) 42kPa (R)
2.00																	>190kPa (U)
																	>190kPa (U)
3.00																>190kPa (U)	
3.15																	
		End of Borehole at 3.15 m															
Remarks:																	

Remarks:


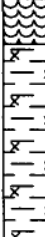
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		PROJECT: WEST COAST ROAD						HOLE No. HA18						
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1								
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: SL								
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS	
										LIMITS: PLASTIC = X      LIQUID = + 20      40      60 IN SITU VANE (kPa) = ✱ 50      100      150				
0.35		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketokua Formation											
		CLAY: silty, fine sandy, very stiff, moderately plastic, light brown grey with orange mottles												>222kPa (U)
1.00		increasing sand, (fine to medium grained), moist												134kPa (U) 50kPa (R)
		pumiceous grains												117kPa (U) 68kPa (R)
2.00		free water at 1.8m											192kPa (U) 59kPa (R)	
2.55		banded CLAY: silty, very stiff, moderately plastic, light to mid grey and SAND: clayey, 'medium dense to dense', (fine grained), slightly plastic, mid grey	Waitemata Group											Unable to Penetrate
3.00														Unable to Penetrate
3.15		End of Borehole at 3.15 m												
Remarks:														

		SUMMARY OF SOIL PROFILE & TESTING				JOB No.	42608									
PROJECT:		WEST COAST ROAD				HOLE No.	HA19									
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1										
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: GC/WEC										
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS											
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X      LIQUID = + IN SITU VANE (kPa) = ✱ 20      40      60 50      100      150			OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded SPT / Scala Penetrometer			
0.45		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation													
		CLAY: slightly sandy, very stiff, moderately plastic, brown orange mottled			X	A1										106kPa (U) 42kPa (R)
1.00					X	A2						●		✱		162kPa (U) 57kPa (R)
1.60					X	A3	HA					●		✱		137kPa (U) 75kPa (R)
2.00		SAND: silty, some clay, (medium dense) slightly to moderately plastic, pumiceous light grey with orange and white grains	Waitemata Group													
2.20		CLAY: fine sandy, very stiff, moderately plastic, light grey with orange mottles			X	A4								✱		113kPa (U) 50kPa (R)
		less sand			X	A5								✱		109kPa (U) 76kPa (R)
3.00		banded CLAY/SAND, free water at 2.9m														
3.15					X	A6								✱	185kPa (U) 35kPa (R)	
		End of Borehole at 3.15 m														



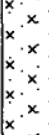


Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608			
		PROJECT: WEST COAST ROAD						HOLE No. HA20			
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1					
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: SL					
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS						
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ● LIMITS: PLASTIC = X LIQUID = + IN SITU VANE (kPa) = ✱ 50 100 150	OTHER TESTS Corrected Shear Vane Result ** U = peak / R = remoulded SPT / Scala Penetrometer
0.25		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketokai Formation								109kPa (U) 46kPa (R)
		CLAY: silty, fine sandy, very stiff, moderately plastic, light brown grey with orange mottles									
1.00		SILTSTONE: [CW-HW] Silt, sandy, some clay, hard, grey with orange staining - unable to auger further	Waitemata Group								145kPa (U) 65kPa (R)
1.20											
		End of Borehole at 1.2 m									

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING										JOB No.		42608						
PROJECT:		WEST COAST ROAD										HOLE No.		HA21						
DATE STARTED: 22/05/2006		METHOD: HA				RIG: 50mm dia Auger				SHEET 1 of 1										
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd				FLUID: None				LOGGED BY: GC/WEC										
DEPTH (m)	SOIL/ROCK DESCRIPTION										SAMPLES RECOVERED & TEST RESULTS									
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  <small>For an explanation of the terms &amp; symbols used see attached sheets.</small>	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS							
										LIMITS: PLASTIC = X      LIQUID = +		Corrected Shear Vane Result **								
										20      40      60 IN SITU VANE (kPa) = ※ 50      100      150			U = peak / R = remoulded  SPT / Scala Penetrometer							
0.15		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketaka Formation																	
		CLAY: silty, fine sandy, very stiff, moderately plastic, light brown grey with orange mottles						HA												
0.80																				
1.00		SANDSTONE: [HW] moderately weak, fine to medium grained, orange brown - unable to auger further	Waitemata Group																	
		End of Borehole at 0.8 m																		

Remarks:

		SUMMARY OF SOIL PROFILE & TESTING						JOB No. 42608								
		PROJECT: WEST COAST ROAD						HOLE No. HA22								
DATE STARTED: 22/05/2006		METHOD: HA		RIG: 50mm dia Auger		SHEET 1 of 1										
DATE FINISHED: 22/05/2006		DRILLED BY: Babbage Consultants Ltd		FLUID: None		LOGGED BY: SL/WEC										
DEPTH (m)	SOIL/ROCK DESCRIPTION				SAMPLES RECOVERED & TEST RESULTS											
	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●			OTHER TESTS			
										LIMITS: PLASTIC = X LIQUID = +			Corrected Shear Vane Result **			
										20 40 60			U = peak / R = remoulded			
										IN SITU VANE (kPa) = ✱			SPT / Scala Penetrometer			
										50 100 150						
0.30		TOPSOIL: Silt, firm, slightly plastic, dark brown	Alluvium - Puketoka Formation													
		SILT: fine sandy, clayey, stiff to very stiff, moderately plastic, light to mid grey with orange mottles			X	A1										90kPa (U) 41kPa (R)
0.80		SAND: silty, minor clay, 'medium dense', slightly plastic, grey brown orange streaked			X	A2										150kPa (U) 53kPa (R)
1.00		less clay, slight to non plastic, greenish grey with minor pumice flecks, free water at 1.5m			X	A3										>222kPa (U)
1.90		MUDSTONE: [MW] moderately weak, dark grey - unable to auger further	Waitemata Group												Unable to Penetrate	
2.00		End of Borehole at 1.9 m														

Remarks:



## SUMMARY OF SOIL PROFILE &amp; TESTING

JOB No.

42608

PROJECT:

WEST COAST ROAD

HOLE No.

HA23

DATE STARTED: 22/05/2006

METHOD: HA

RIG: 50mm dia Auger

SHEET 1 of 1

DATE FINISHED: 22/05/2006

DRILLED BY: Babbage Consultants Ltd

FLUID: None

LOGGED BY: SL/WEC

SOIL/ROCK DESCRIPTION		SAMPLES RECOVERED & TEST RESULTS															
DEPTH (m)	SOIL SYMBOL	DATUM: Ground Surface  SURFACE ELEVATION:  For an explanation of the terms & symbols used see attached sheets.	GEOLOGIC UNIT	GROUND WATER	CONDITION	TYPE	METHOD	RECOVERY (%)	PENETRATION RESISTANCE	MOISTURE CONTENTS = ●						OTHER TESTS	
										LIMITS: PLASTIC = X      LIQUID = +			IN SITU VANE (kPa) = ※			Corrected Shear Vane Result **	
										20	40	60	50	100	150	U = peak / R = remoulded  SPT / Scala Penetrometer	
0.30   																	

Remarks:

## EXPLANATION OF TERMS AND SYMBOLS
















These pages present an explanation of the terms and symbols used on the log sheets entitled "Summary of Soil Profile and Testing". The materials, boundaries and conditions have been interpreted at the test hole locations only and could differ elsewhere on the site.

### 1. DEPTH / ELEVATION

This column refers to the depth below the ground surface existing at the time of drilling. The corresponding elevations are shown with respect to the datum noted where survey information is available.

### 2. SOIL AND ROCK SYMBOL

This column contains the standard soil and rock symbols used by Babbage for the materials encountered in the boreholes as shown below:

	Fill		Clay		Boulders
	Asphalt		Silt		Sandstone
	Concrete		Sand		Siltstone
	Topsoil		Gravel		Volcanic Rock
	Peat or Organic Soil		Cobbles		Uncertain Material

### 3. SOIL AND ROCK DESCRIPTION

The terms used to describe the soils and rocks are generally in accordance with the NZ Geomechanics Society's "**Guidelines for the Field Description of Soils and Rocks in Engineering Use**", Nov. 1988 and the NZ Geotechnical Society's "**Guidelines for the Classification and Field Description of Soils and Rocks for Engineering Purposes**" Feb 2003 (draft for comment).

The **soils** are generally described in the following order:

Major soil type, minor soil type/s, consistency (for cohesive soils) or density (for cohesionless soils), plasticity, structure and/or particle shapes, colour, moisture condition, minor inclusions, other significant aspects (e.g. geological description).

Where rock is encountered, the **rock material** and the **rock mass** are described in the following order:

Major rock type, texture and fabric, strength, weathering, colour, discontinuity type, discontinuity spacing, discontinuity orientation, discontinuity opening, discontinuity roughness, geological description (if this can be determined).

Where no field or laboratory tests are carried out, the soils and rock descriptions are based on handling and visual assessment of the recovered samples. **Any design based on such descriptions should allow for the generic nature of the descriptions.**

### 4. GEOLOGIC UNIT

This column divides the soil and/or rock encountered in the borehole into units that have been formally described and published by geologists (determined from geological maps), or informal units describing what general categories the materials belong to eg. fill, weathered rock, alluvium, etc.




## EXPLANATION OF TERMS AND SYMBOLS

### 5. PIEZOMETER

This column graphically displays what happens to the hole on completion of drilling – ie. whether the hole is backfilled, left open with a plug, or if a piezometer/standpipe is installed. Details of the installation are given in the "Remarks" section at the bottom of the log.

### 6. GROUNDWATER

The groundwater level, or the depth at which free water was observed in the borehole, or any seepage observed in the borehole, are denoted by the symbols given below.

 water level at time of drilling     
  water level at a later date     
  observed seepage

The level is the water level in an open hole unless otherwise indicated.

**N** in the column indicates the water level could not be recorded due to drilling water/mud, rain or hole caving.

**NR** in this column indicates that no record of the groundwater level was taken.





**D** in this column indicates that the hole was dry.



**F** in this column indicates when free water in the hole was first noticed.

### 7. SOIL SAMPLES

#### Condition

This column indicates the depth, length and condition of each sample taken. The following symbols are used to represent the condition of the samples.

 undisturbed     
  disturbed/remoulded     
  sample / solid nose SPT test     
  standard penetration

 no recovery     
  rock core

#### Type (and sample number)

The type of sample and its sequential number is indicated in this column as follows:

<b>A</b>	auger sample	<b>P</b>	piston tube sample
<b>B</b>	block or bulk sample	<b>S</b>	standard penetration test (SPT) sample
<b>D</b>	disturbed sample (eg. open barrel core)	<b>T</b>	thin-walled tube sample
<b>J</b>	jar sample	<b>W</b>	wash or air return sample
<b>GW</b>	ground water sample	<b>O</b>	other (see text)

Disturbed soils samples are transported and stored in plastic bags. Machine borehole disturbed samples are transported and stored in core boxes. Tube samples are sealed with plastic bags in the field and with wax on return to the laboratory.

#### Method

This refers to the particular drilling/sampling technique:

<b>HA</b>	hand auger	<b>TU</b>	push-tube
<b>HD</b>	hand dug	<b>SSA</b>	solid stem machine auger
<b>HSA</b>	hollow stem machine auger	<b>SPT</b>	standard penetration test
<b>EX</b>	hydraulic excavator	<b>SP</b>	scala penetrometer
<b>OB</b>	open barrel	<b>TT</b>	triple tube
<b>PP</b>	pneumatic percussion	<b>WD</b>	wash drill

## EXPLANATION OF TERMS AND SYMBOLS

### Recovery

This column gives the sample recovery as a percentage of the sampled length for open barrel and triple tube core runs, and also split spoon SPT tests. If nothing is shown, the sample recovery was not measured.

## 8. TEST RESULTS

### Penetration Resistance

The Penetration Resistance is the number of blows required to drive either a 50mm (outside diameter) open end "spilt spoon" or "Raymond" sampler the final 300mm of a 450mm penetration using a 64kg weight falling 760mm. The number of blows required to drive the sampler the final 300mm is referred to as the "**N**" value. The test is referred to as the **Standard Penetration Test or SPT**. The number of blows for each 150mm penetration of the test, or part-penetration when driving is terminated due to hard ground, are given in the "Other Tests" column, e.g. 15, 36, 46 for 55mm would indicate 15 blows for the first 150mm, 36 blows for the second 150mm and 46 blows for a further 55mm penetration and a N value of greater than 50 would be reported.

In some cases a solid steel 60° cone is used for this test (a **solid nose Standard Penetration Test**). For these cases the penetration resistance is reported as an "**S**" value is reported in this column.

### Water Content and Atterberg Limits

The moisture or water content, plastic limit and liquid limit of the recovered soil sample, as determined in the laboratory in accordance with the test procedures set out in NZS4402, is plotted against depth. The abbreviations and graphic symbols are defined as follows:

•	w	natural moisture content
×	w <sub>p</sub>	plastic limit
+	w <sub>L</sub>	liquid limit

### Other Tests

The following abbreviations are used to indicate the type of test undertaken:

COM	Compaction Test	pp	Pocket penetrometer strength
*CON	Consolidation test	*Q	Consolidated undrained triaxial test
G	Specific gravity or solid density of particles	qu	Unconfined compressive strength
k	Permeability coefficient	*SB	Shear box test
LS	Linear shrinkage	SP	Scala penetrometer
OC	Organic content	*ST	Swelling test
*PSD	Particle size distribution	SV	Vane shear strength: (U) – undisturbed (R) – remoulded

\*These tests are usually summarised separately.

## 9. REMARKS

Any additional observations or relevant information such as weather conditions, piezometer design, daily drilling progress, survey co-ordinates of the borehole, problems encountered during drilling, etc.

## **Appendix C**

### **Laboratory Testing**



Babbage Geotechnical Laboratory  
109 Fanshawe Street  
Freemans Bay  
Auckland  
Telephone  
Fax  
Email

P O Box 2027  
New Zealand  
64-9-367 4954  
64-9-377 0554  
[wec@babbage.co.nz](mailto:wec@babbage.co.nz)

Please reply to: W.E. Campton

Page 1 of 2

Babbage Consultants Limited  
P O Box 2027  
Auckland, New Zealand

Job Number: 42608/GE/L

File:

Checked by: *J.F.*

JF

26<sup>th</sup> May 2006

Attention: **RUSSELL ALLISON**

Dear Sir,

**Re: West Coast Road, Henderson  
Moisture Content Testing  
Report No. 42608/GE/L/MC**

The following table presents the results of moisture content testing on hand auger soil samples collected by this laboratory during late May 2006. Test Standards used are as follows:

**Moisture Content NZS4402:1986:Test 2.1**

Hole No.	Sample No.	Depth (m)	Moisture Content (%)	Hole No.	Sample No.	Depth (m)	Moisture Content (%)
HA1	A1	0.5	23.5	HA7	A1	0.5	31.3
	A2	1.0	26.0		A2	1.0	44.8
HA2	A1	0.5	25.2		A3	1.5	38.4
	A2	1.0	47.6		A4	2.0	75.0
HA3	A1	0.5	34.6		A5	2.5	76.6
	A2	1.0	39.8		A6	3.0	74.9
	A3	1.5	40.0	HA8	A1	0.5	39.8
	A4	2.0	34.0		A2	1.0	47.1
	A5	2.5	34.7	HA9	A2	1.0	31.6
	A6	3.0	45.8		A3	1.5	30.7
HA4	A2	1.0	44.5		A4	2.0	47.5
	A3	1.5	41.3		A5	2.5	53.2
HA5	A2	1.0	43.9		A6	3.0	70.5
	A3	1.5	50.5	HA10	A2	1.0	15.2
HA6	A2	1.0	45.2	HA11	A2	1.0	37.5
					A3	1.5	80.4
					A4	2.0	73.2

Hole No.	Sample No.	Depth (m)	Moisture Content (%)	Hole No.	Sample No.	Depth (m)	Moisture Content (%)
HA12	A1	0.5	44.9	HA15	A2	1.0	48.2
	A2	1.0	90.0		A3	1.5	42.6
	A3	1.5	74.2		A4	2.0	37.0
	A4	2.0	63.7		A5	2.5	53.7
	A5	2.5	60.9		A6	3.0	120
	A6	3.0	58.5				
HA13	A1	0.5	34.2	HA16	A1	0.5	35.5
	A2	1.0	43.9		A2	1.0	33.4
	A3	1.5	39.2				
	A4	2.0	48.7	HA17	A1	0.5	31.9
	A5	2.5	61.5		A2	1.0	27.7
	A6	3.0	55.8		A3	1.5	52.0
HA14	A1	0.5	31.1				
	A2	1.0	67.8	HA18	A2	1.0	29.6
	A3	1.5	50.6		A3	1.5	26.2
	A4	2.0	40.7				
	A5	2.5	31.6	HA19	A2	1.0	33.7
	A6	3.0	35.7		A3	1.5	35.5
HA15	A1	0.5	43.4	HA20	A1	0.5	34.1
				HA21	A1	0.5	44.1

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the undersigned at your convenience.

Yours faithfully,



Wayne Campton  
Signatory (Laboratory Manager)  
Babbage Geotechnical Laboratory



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

## **Appendix 12**

### **Engineering Calculations**

SEDIMENT DETENTION POND

(Based on Auckland Regional Council's TP 10 - Stormwater Treatment Devices)

Job No: 42608 By: GW Date: 15/06/2006  
Project: West Coast Road

CATCHMENT CHARACTERISTICS

Catchment Area:	19600 m <sup>2</sup>
Imperviousness Percentage:	0%
Imperviousness Area (A <sub>imp</sub> ):	0 m <sup>2</sup>
Pervious Percentage:	100%
Pervious Area (A <sub>perv</sub> ):	19600 m <sup>2</sup>

POND SIZE

Pond Size:	588 m <sup>3</sup>
Dead Storage:	176 m <sup>3</sup>
Live Storage:	412 m <sup>3</sup>
Average Depth:	2.2 m
Decant Rate:	5.9 l/s
Pond Dimension - Width:	9.4 m
Pond Dimension - Length:	28.3 m
No. of Decants:	3

## Project :

West Coast Road

The Universal Soil Loss Equation (USLE) is used to estimate soil loss.

The general form of this equation is  $A = R K L S C P$  (Goldman et al) where:

**A - Soil Loss (tonnes/hectare/year)**

**R - Rainfall Erosion Index (J/hectare)**

Rainfall data has been sourced from ARC TP. 108: Guidelines for Stormwater Runoff Modelling in the Auckland Region, April 1999. As determined from Hirds, the 6hr duration for the 2 year return frequency rainfall event of 49.61. The rainfall erosion index factor for this storm is 75.64

**K - Soil Erodibility Factor:**

To calculate K, the percentage of sand, silt and clay must be known for each dominant soil type within the site. Based on results done by BCL (June 2006), the soil properties for this site can be taken as 17% sand, 27% silt, 56% clay and the top soil contains approximately 10% organic material.

Therefore, Triangular Nomograph K Value: 0.21  
Correction factor for 3% organic material in top soil: -0.10

**Adjusted K Value: 0.15**

**C - Cover factor**

The C factor is the ration of soil loss under specified conditions to that of a bare site. When the soil is protected against erosion then the C factor will reduce the soil loss estimate. A C factor of 1.0 is used when the soil surface is bare during construction. A C factor of 0.02 has been assumed for the current situation (pasture -undisturbed).

**P - Erosion Control Practice Factor**

A P factor of 1.0 is used to reflect compacted and smooth surface conditions for usual cut and fill areas during construction. This factor is reduced to 1.0 during stabilisation works to reflect the top soild surfaces.

Stage of works	R	K	C	P	RKCP
During Construction	75.64	0.15	1	1.3	14.28
During Stabilisation	75.64	0.15	0.1	1.0	1.098

## LS - Length Slope Factor

The Length Slope Factor, LS can be calculated from the following:

$$LS = (((65.41 * s^2) / (s^2 + 10000)) + ((4.56 * s) / \sqrt{s^2 + 10000}) + 0.065) * (l / 72.5)^{nn}$$

Where :

LS	Topographic factor	
l	Slope length, ft ((m*0.3048)	
s	Slope steepness	
nn	Exponent dependent on slope steepness:	
	Slope	nn
	<1%	0.2
	>1% but <3%	0.3
	>3% but <5%	0.4
	>5%	0.5

Representative slope lengths are sourced from Drawing No. 42608/C05 and C06.

Based on Drawings 42608/C05 AND C06, the following factors have been used:

Area A	Average slope = 15%
	Average flow distance = 100m
Area B	Average slope = 14%
	Average flow distance = 35m
Area C	Average slope = 14%
	Average flow distance = 45m
Area D	Average slope = 12%
	Average flow distance = 35m

### During Construction

Earthworks Area	Length (m)	l (ft)	Slope (s) (%)	nn	LS
Area A	100	328.08399	15	0.5	4.639101143
Area B	35	114.8294	14	0.5	2.459920402
Area C	45	147.6378	14	0.5	2.789287555
Area D	35	114.8294	12	0.5	1.93412649

### During Stabilization

Earthworks Area	Length (m)	l (ft)	Slope (s) (%)	nn	LS
Area A	90	295.27559	6	0.5	1.155852499
Area B	35	114.8294	6	0.5	0.720800674
Area C	45	147.6378	6	0.5	0.81731114
Area D	35	114.8294	6	0.5	0.720800674

### Retention of Sediment

The USLE model estimates sediment generation but makes no allowance for any deposition on site prior to run-off. Coarser textured sediments are expected to be deposited as runoff velocities diminish. 50% of the estimated sediment is expected to be retained on site in hollows, wheel runs, etc. prior to runoff. We assumed that a further 95% of sediment generated in Area A will be retained in the silt ponds on the site due to flocculation.

## SOIL LOSS - DURING CONSTRUCTION

Area	Operation	Time (years)
Area A	Earthworks (cut/fill)	0.25
Area B	Earthworks (cut/fill)	0.167
Area C	Earthworks (cut/fill)	0.167
Area D	Earthworks (cut/fill)	0.1

Earthworks Area	Area	USLE Parameters					Time	Estimate of Sediment Generated	Sediment Delivery Ratio	Sediment Control Efficiency	Sediment Yield
	(ha)	R	K	LS	C	P	(yrs)	(tonnes)		(%)	(tonnes)
Area A	1.97	75.64	0.15	4.6	1.00	1.3	0.25	32.620	0.5	95	0.82
Area B	0.90	75.64	0.15	2.5	1.00	1.3	0.167	5.279	0.5	0	2.64
Area C	0.59	75.64	0.15	2.8	1.00	1.3	0.1	2.350	0.5	0	1.17
Area D	0.62	75.64	0.15	1.9	1.00	1.3	0.1	1.718	0.5	0	0.86
Total:	4.08										5.49

## SOIL LOSS - DURING STABILIZATION

Area	Operation	Time (years)
Area A	Top soil	0.08
Area B	Top soil	0.08
Area C	Top soil	0.08
Area D	Top soil	0.08

Earthworks Area	Area	USLE Parameters					Time	Estimate of Sediment Generated	Sediment Delivery Ratio	Sediment Control Efficiency	Sediment Yield
	(ha)	R	K	LS	C	P	(yrs)	(tonnes)		(%)	(tonnes)
Area A	1.97	75.64	0.15	1.2	0.10	1.0	0.08	0.200	0.5	95	0.01
Area B	0.90	75.64	0.15	0.7	0.10	1.0	0.08	0.057	0.5	0	0.03
Area C	0.59	75.64	0.15	0.8	0.10	1.0	0.08	0.042	0.5	0	0.02
Area D	0.62	75.64	0.15	0.7	0.10	1.0	0.08	0.039	0.5	0	0.02
Total:	4.08										0.07

Total Sediment Yield: 5.56 tonnes

TP108 - POND DESIGN GENERAL

Project:	West Coast Raod	By: WL	Date: 14/06/06
Job No.:	42608	Checked:	Date:

Combination of Stage 1 and 2

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	4.9323
TOTAL	4.9323

Post-Development

Hardstand/Roof area (ha)	1.9226
Other (pervious) area (ha)	2.7407
TOTAL	4.6633

Hydrology	
2 year	84 mm
10 year	134 mm
100 year	195 mm

### TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Raod* By: WL Date: 14/06/06  
 Location: 42608 Checked: Date:

#### 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Pasture</i>	74	4.9323	365
	Subtotal for Pervious Areas		4.9323	365
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	0.000	0
	Subtotal for Impervious Areas		0	0
	Totals		4.9323	365

\* from Table 3.3

CN (weighted) :  $\frac{\text{total product}}{\text{total area}} = \frac{365}{4.9323} = 74$

Ia (weighted) :  $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 4.9323}{4.9323} = 5.00 \text{ mm}$

#### 2. Time of Concentration

Channelisation Factor : C = 1 (from Table 4.2)

Catchment Length : L = 0.147 km (along drainage path)

Catchment Slope : Sc = 0.109 m/m (by equal area method)

Runoff Factor R :  $\frac{\text{CN}}{200 - \text{CN}} = 0.59$

Time of Concentration :  $t_c = 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs}$

SCS Lag for HEC-HMS :  $t_p = \frac{2}{3} t_c = 0.11 \text{ hrs}$

3. Soil Storage Parameter :  $S = ((1000/\text{CN}) - 10) \times 25.4$

Total	=	89.2	mm
Pervious	=	89.2	mm
Impervious	=	5.2	mm

#### 4. Average Recurrence Interval, ARI (yr) :

#### 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

6. Runoff Index, c\* :  $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$

#### 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

8. Peak Flow Rate, q<sub>p</sub> :  $= q^* A P_{24} \text{ (m}^3/\text{s)}$

9. Runoff Depth, Q<sub>24</sub> :  $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \text{ (mm)}$

10. Runoff Volume, V<sub>24</sub> :  $= 1000 \times Q_{24} A \text{ (m}^3)$

	Storm #1	Storm #2	Storm #3
	2	10	100
	84	134	195
	0.29	0.41	0.51
	0.082	0.108	0.126
	0.340	0.714	1.212
Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
Pervious	1,830	3,761	6,376
Impervious	000	000	000
Total	1,830	3,761	6,376

# TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Raod* By: WL Date: 14/06/06  
 Location: ## Checked: 0 Date:

## 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Cut faces</i>	74	2.7407	203
	Subtotal for Pervious Areas		2.7407	203
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	1.923	188
	Subtotal for Pervious Areas		1.9226	188
	Totals		4.6633	391

\* from Table 3.3

$$\begin{aligned} \text{CN (weighted)} : & \frac{\text{total product}}{\text{total area}} = \frac{391}{4.6633} = 84 \\ \text{Ia (weighted)} : & \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 2.7407}{4.6633} = 2.9 \text{ mm} \end{aligned}$$

## 2. Time of Concentration

$$\begin{aligned} \text{Channelisation Factor : } C &= 0.6 \text{ (from Table 4.2)} \\ \text{Catchment Length : } L &= 0.147 \text{ km (along drainage path)} \\ \text{Catchment Slope : } S_c &= 0.109 \text{ m/m (by equal area method)} \\ \text{Runoff Factor R : } \frac{CN}{200 - CN} &= 0.72 \end{aligned}$$

$$\begin{aligned} \text{Time of Concentration : } t_c &= 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs} \\ \text{SCS Lag for HEC-HMS : } t_p &= \frac{2}{3} t_c = 0.11 \text{ hrs} \end{aligned}$$

$$\begin{aligned} \text{3. Soil Storage Parameter : } S &= ((1000/CN)-10)*25.4 \quad \text{Total} = 49 \text{ mm} \\ & \quad \text{Pervious} = 89 \text{ mm} \\ & \quad \text{Impervious} = 5 \text{ mm} \end{aligned}$$

## 4. Average Recurrence Interval, ARI (yr) :

## 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$$

## 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \text{ (m}^3/\text{s)}$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \text{ (mm)}$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \text{ (m}^3\text{)}$$

Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Erosion	1/3 *2	2	10	100
34.5	28.0	84	134	195
0.23	0.18	0.44	0.57	0.66
0.066	0.052	0.112	0.133	0.145
0.11	0.07	0.44	0.83	1.32
Pervious	7.3	4.7	37.1	76.2
Impervious	30.0	23.6	79.1	129.0
Pervious	201	129	1,017	2,090
Impervious	577	454	1,521	2,480
Total	778	583	2,538	4,570

TP10 - WATER QUALITY POND DESIGN (Low Flow Orifice)

TP10 - WATER QUALITY POND DESIGN (Low Flow Orifice)				Orifice	Notch	Weir	Spillway					
				Diameter	0.08	0.2	1.05	12.61				
Project:	West Coast Road	By: WL	Date: 14/06/06	Elevation	16.95	18.56	18.65	18.75				
				Coefficient	0.62	1.8	1.8	1.8				
Location:	42608	Checked: 0	Date: 0	0.1	Outflow (m³/s)			Copy data to HEC-HMS				
				Depth	Orifice	Notch	Weir	Combined	Depth	Vol	Outflow	
									m	1000m3	(m3/s)	
Assume Shape												
Permanent Water Surface RL			16.95 mRL	16.75	0	0	0	0	16.75	0.00	0	0.0
Base Width			na m	16.80	0	0	0	0	16.80	0.00	0	4.0
Base Length			na m	16.90	0	0	0	0	16.90	0.02	0	15.5
Assumed side slope			na m(hor):m(ver)	17.00	0.003087	0	0	0.003087	17.00	0.03	0.003087	32.1
				17.10	0.005346	0	0	0.005346	17.10	0.05	0.005346	52.8
Water Quality Treatment Pond Dimensions :				17.20	0.006902	0	0	0.006902	17.20	0.08	0.006902	76.4
Assumed Depth of WQV			d = 0.5 m	17.30	0.008167	0	0	0.008167	17.30	0.10	0.008167	102.9
Top Elevation of Water Quality Volume :			H = 16.95 mRL	17.40	0.00926	0	0	0.00926	17.40	0.13	0.00926	132.3
Water Quality Volume :			V <sub>d</sub> = 583 m³	17.50	0.010237	0	0	0.010237	17.50	0.16	0.010237	164.7
Permanent Water Quality Volume :			V <sub>d(perm)</sub> = 292 m³	17.60	0.011129	0	0	0.011129	17.60	0.20	0.011129	200.3
Total Forebay Volume Requirement :			V <sub>forebay</sub> = 88 m³	17.70	0.011955	0	0	0.011955	17.70	0.24	0.011955	239.0
				17.80	0.012727	0	0	0.012727	17.80	0.28	0.012727	280.9
Extended Detention Outlet Design :				17.90	0.013455	0	0	0.013455	17.90	0.33	0.013455	326.1
Extended Detention Volume :			V <sub>ex</sub> = 778 m³	18.00	0.014145	0	0	0.014145	18.00	0.37	0.014145	374.6
Average Discharge Release Rate :			Q <sub>avg</sub> = 0.0090 m³/sec	18.10	0.014803	0	0	0.014803	18.10	0.43	0.014803	426.4
Top Elevation of Extended Detention Volume :			Hex = 18.56 m	18.20	0.015434	0	0	0.015434	18.20	0.48	0.015434	481.8
Height of Extended Detention Volume			hex = 1.61 m	18.30	0.016039	0	0	0.016039	18.30	0.54	0.016039	540.7
Maximum Discharge Release Rate :			Q <sub>max</sub> = 0.0180 m³/sec	18.40	0.016622	0	0	0.016622	18.40	0.60	0.016622	603.1
Selected Orifice Diameter :			d <sub>orifice</sub> = 0.08 m	18.50	0.017186	0	0	0.017186	18.50	0.67	0.017186	669.1
Orifice Discharge Rate			Q <sub>i</sub> = 0.0173 m³/sec < Q <sub>max</sub> OK	18.60	0.017732	0.00288	0.044620881	0.065233	18.60	0.74	0.065233	738.8
				18.65	0.017998	0.00972	0.150595473	0.178314	18.65	0.78	0.178314	775.5
				18.70	0.018261	0.018858	0.292173085	0.329292	18.70	0.81	0.329292	812.2
100 Year Storm Flood Routing				18.75	0.01852	0.029815	0.461932538	0.510268	18.75	0.85	0.510268	850.0
100 year Post Development Max Flow :			Q100 = 1.319 m³/sec	18.80	0.018776	0.042327	0.655790341	0.716893	18.80	0.89	0.716893	889.4
Depth over weir:			h100 = 0.150 m	18.90	0.019277	0.071371	1.105774393	1.196422	18.90	0.97	1.196422	970.4
Width of Emergency Spillway			h100 = 12.61 m	19.00	0.019765	0.105071	1.627897918	1.752733	19.00	1.05	1.752733	1050.0
				19.10	0.020241	0.142854	2.2132924	2.376388	19.10	1.13	2.376388	1130.0
				19.20	0.020706	0.18432	2.855736379	3.060763	19.20	1.22	3.060763	1220.0
				19.25	0.020935	0.206337	3.19684654	3.424118	19.25	1.31	3.424118	1310.0

HMS \* Summary of Results for Reservoir-1

Project : West Coast Rd

Run Name : Run 8

Start of Run : 01Jan03 0000 Basin Model : Pakuranga

End of Run : 02Jan03 0000 Met. Model : 10-year event

Execution Time : 22Jun06 1814 Control Specs : Control CHicago

Computed Results

Peak Inflow : 0.77856 (cms) Date/Time of Peak Inflow : 01 Jan 03 1212

Peak Outflow : 0.72795 (cms) Date/Time of Peak Outflow : 01 Jan 03 1215

Total Inflow : 92.3 (mm) Peak Storage : 0.89185(X cu m)

Total Outflow : 78.3 (mm) Peak Elevation : 18.802(m)

HMS \* Summary of Results for Reservoir-1

Project : West Coast Rd

Run Name : Run 7

Start of Run : 01Jan03 0000 Basin Model : Pakuranga

End of Run : 02Jan03 0000 Met. Model : 2 year event

Execution Time : 19Jun06 1438 Control Specs : Control CHicago

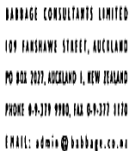
Computed Results

Peak Inflow : 0.41444 (cms) Date/Time of Peak Inflow : 01 Jan 03 1213

Peak Outflow : 0.21202 (cms) Date/Time of Peak Outflow : 01 Jan 03 1223

Total Inflow : 49.3 (mm) Peak Storage : 0.78670(K cu m)

Total Outflow : 36.8 (mm) Peak Elevation : 18.661(m)



## 0

10% AEP

[illegible]

**TP108 - POND DESIGN GENERAL**

Project:	West Coast Raod	By: WL	Date: 14/06/06
Job No.:	42608	Checked:	Date:

**Stage 1**

**Pre-Development**

<b>Hardstand/Roof</b> area (ha)	0
<b>Other (pervious)</b> area (ha)	3.3948
<b>TOTAL</b>	3.3948

**Post-Development**

<b>Hardstand/Roof</b> area (ha)	1.2378
<b>Other (pervious)</b> area (ha)	1.7112
<b>TOTAL</b>	2.9490

<b>Hydrology</b>	
2 year	84 mm
10 year	134 mm
100 year	195 mm

# TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: West Coast Road By: WL Date: 14/06/06  
 Location: 42608 Checked: Date:

## 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
Waitemata clay, Class C Waitemata clay, Class C	Pervious Areas (List)			
	Bush	70	0	0
	Pasture	74	3.3948	251
	Subtotal for Pervious Areas		3.3948	251
	Impervious Areas (List)			
	Roads / paved	98	0.000	0
	Subtotal for Impervious Areas		0	0
	Totals		3.3948	251

\* from Table 3.3

$$\begin{aligned} \text{CN (weighted)} : & \frac{\text{total product}}{\text{total area}} = \frac{251}{3.3948} = 74 \\ \text{Ia (weighted)} : & \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 3.3948}{3.3948} = 5.00 \text{ mm} \end{aligned}$$

## 2. Time of Concentration

$$\begin{aligned} \text{Channelisation Factor : } C &= 1 \quad (\text{from Table 4.2}) \\ \text{Catchment Length : } L &= 0.147 \text{ km (along drainage path)} \\ \text{Catchment Slope : } S_c &= 0.109 \text{ m/m (by equal area method)} \\ \text{Runoff Factor R : } \frac{CN}{200 - CN} &= 0.59 \\ \text{Time of Concentration : } t_c &= 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs} \\ \text{SCS Lag for HEC-HMS : } t_p &= \frac{2}{3} t_c = 0.11 \text{ hrs} \end{aligned}$$

$$\begin{aligned} \text{3. Soil Storage Parameter : } S &= ((1000/CN) - 10) \times 25.4 \\ \text{Total} &= 89.2 \text{ mm} \\ \text{Pervious} &= 89.2 \text{ mm} \\ \text{Impervious} &= 5.2 \text{ mm} \end{aligned}$$

## 4. Average Recurrence Interval, ARI (yr) :

## 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$$

## 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \quad (\text{m}^3/\text{s})$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \quad (\text{mm})$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \quad (\text{m}^3)$$

	Storm #1	Storm #2	Storm #3
2	2	10	100
84	84	134	195
0.29	0.29	0.41	0.51
0.082	0.082	0.109	0.125
0.234	0.234	0.496	0.827
Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
Pervious	1,259	2,589	4,389
Impervious	000	000	000
Total	1,259	2,589	4,389

**TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)**

Project: *West Coast Raod* By: *WL* Date: *14/06/06*

Location: *##* Checked: *0* Date:

**1. Runoff Curve Number (CN) and Initial Abstraction (Ia)**

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Cut faces</i>	74	1.7112	127
	Subtotal for Pervious Areas		1.7112	127
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	1.238	121
	Subtotal for Pervious Areas		1.2378	121
	Totals		2.949	248

\* from Table 3.3

CN (weighted) :  $\frac{\text{total product}}{\text{total area}} = \frac{248}{2.949} = 84$

Ia (weighted) :  $\frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.7112}{2.949} = 2.9 \text{ mm}$

**2. Time of Concentration**

Channelisation Factor :  $C = 0.6$  (from Table 4.2)

Catchment Length :  $L = 0.147 \text{ km}$  (along drainage path)

Catchment Slope :  $Sc = 0.109 \text{ m/m}$  (by equal area method)

Runoff Factor R :  $\frac{CN}{200 - CN} = 0.73$

Time of Concentration :  $t_c = 0.14 C L^{0.66} R^{-0.55} Sc^{-0.30} = 0.17 \text{ hrs}$

SCS Lag for HEC-HMS :  $t_p = 2/3 t_c = 0.11 \text{ hrs}$

3. Soil Storage Parameter :  $S = ((1000/CN)-10) \times 25.4$

Total	=	48	mm
Pervious	=	89	mm
Impervious	=	5	mm

**4. Average Recurrence Interval, ARI (yr) :**

**5. 24 hour Rainfall Depth,  $P_{24}$  (mm), (from Appendix A)**

6. Runoff Index,  $c^*$  :  $= \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$

**7. Specific Peak Flow Rate,  $q^*$ , (from Figure 5.1)**

8. Peak Flow Rate,  $q_p$  :  $= q^* A P_{24} \text{ (m}^3/\text{s)}$

9. Runoff Depth,  $Q_{24}$  :  $= \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \text{ (mm)}$

10. Runoff Volume,  $V_{24}$  :  $= 1000 \times Q_{24} A \text{ (m}^3\text{)}$

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Erosion	1/3 *2	2	10	100	
	34.5	28.0	84	134	195
	0.23	0.19	0.45	0.57	0.66
	0.070	0.057	0.116	0.135	0.146
	0.07	0.05	0.29	0.53	0.84
Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
Pervious	125	081	635	1,305	2,212
Impervious	371	292	979	1,597	2,351
Total	497	373	1,614	2,902	4,563

**TP108 - POND DESIGN GENERAL**

Project:	West Coast Road	By: WL	Date: 19/05/06
Job No.:	42608	Checked:	Date:

**Stage 2**

**Pre-Development**

<b>Hardstand/Roof</b> area (ha)	0
<b>Other (pervious)</b> area (ha)	1.5375
<b>TOTAL</b>	1.5375

**Post-Development**

<b>Hardstand/Roof</b> area (ha)	0.6848
<b>Other (pervious)</b> area (ha)	0.8527
<b>TOTAL</b>	1.5375

**Hydrology**

2 year	84 mm
10 year	134 mm
100 year	195 mm

# TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: *WL* Date: *19/05/06*  
 Location: *42608* Checked: Date:

## 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Pasture</i>	74	1.5375	114
	Subtotal for Pervious Areas		1.5375	114
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	0.000	0
	Subtotal for Impervious Areas		0	0
	Totals		1.5375	114

\* from Table 3.3

$$\begin{aligned} \text{CN (weighted)} : & \frac{\text{total product}}{\text{total area}} = \frac{114}{1.5375} = 74 \\ \text{Ia (weighted)} : & \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 1.5375}{1.5375} = 5.00 \text{ mm} \end{aligned}$$

## 2. Time of Concentration

$$\begin{aligned} \text{Channelisation Factor : } C &= 1 \quad (\text{from Table 4.2}) \\ \text{Catchment Length : } L &= 0.046 \text{ km (along drainage path)} \\ \text{Catchment Slope : } S_c &= 0.204 \text{ m/m (by equal area method)} \\ \text{Runoff Factor R : } \frac{CN}{200 - CN} &= 0.59 \end{aligned}$$

$$\begin{aligned} \text{Time of Concentration : } t_c &= 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs} \\ \text{SCS Lag for HEC-HMS : } t_p &= \frac{2}{3} t_c = 0.11 \text{ hrs} \end{aligned}$$

$$\begin{aligned} \text{3. Soil Storage Parameter : } S &= ((1000/CN) - 10) \times 25.4 \\ \text{Total} &= 89.2 \text{ mm} \\ \text{Pervious} &= 89.2 \text{ mm} \\ \text{Impervious} &= 5.2 \text{ mm} \end{aligned}$$

## 4. Average Recurrence Interval, ARI (yr) :

## 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2I_a}{P_{24} - 2I_a + 2S}$$

## 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \quad (\text{m}^3/\text{s})$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a) + S} \quad (\text{mm})$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \quad (\text{m}^3)$$

	Storm #1	Storm #2	Storm #3
	2	10	100
	84	134	195
	0.29	0.41	0.51
	0.109	0.135	0.147
	0.141	0.278	0.441
Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
Pervious	570	1,172	1,988
Impervious	000	000	000
Total	570	1,172	1,988

### TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: *WL* Date: *19/05/06*  
 Location: *##* Checked: *0* Date:

#### 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Cut faces</i>	74	0.8527	63
	Subtotal for Pervious Areas		0.8527	63
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	0.685	67
	Subtotal for Pervious Areas		0.6848	67
	Totals		1.5375	130

\* from Table 3.3

$$\begin{aligned} \text{CN (weighted)} : & \frac{\text{total product}}{\text{total area}} = \frac{130}{1.5375} = 85 \\ \text{Ia (weighted)} : & \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.8527}{1.5375} = 2.8 \text{ mm} \end{aligned}$$

#### 2. Time of Concentration

$$\begin{aligned} \text{Channelisation Factor : } C &= 0.6 \quad (\text{from Table 4.2}) \\ \text{Catchment Length : } L &= 0.046 \text{ km (along drainage path)} \\ \text{Catchment Slope : } S_c &= 0.204 \text{ m/m (by equal area method)} \\ \text{Runoff Factor R : } \frac{CN}{200 - CN} &= 0.73 \end{aligned}$$

$$\begin{aligned} \text{Time of Concentration : } t_c &= 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs} \\ \text{SCS Lag for HEC-HMS : } t_p &= \frac{2}{3} t_c = 0.11 \text{ hrs} \end{aligned}$$

$$\begin{aligned} \text{3. Soil Storage Parameter : } S &= ((1000/CN) - 10) \times 25.4 \\ \text{Total} &= 46 \text{ mm} \\ \text{Pervious} &= 89 \text{ mm} \\ \text{Impervious} &= 5 \text{ mm} \end{aligned}$$

#### 4. Average Recurrence Interval, ARI (yr) :

#### 5. 24 hour Rainfall Depth, $P_{24}$ (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$$

#### 7. Specific Peak Flow Rate, $q^*$ , (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \quad (\text{m}^3/\text{s})$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - Ia)^2}{(P_{24} - Ia) + S} \quad (\text{mm})$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \quad (\text{m}^3)$$

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Erosion	1/3 *2	2	10	100	
34.5	28.0	84	134	195	
0.24	0.20	0.46	0.58	0.67	
0.066	0.048	0.109	0.130	0.145	
0.04	0.02	0.14	0.27	0.43	
Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
Pervious	062	040	316	650	1,102
Impervious	205	162	542	883	1,301
Total	268	202	858	1,534	2,403

TP108 - POND DESIGN GENERAL

Project:	West Coast Raod	By: WL	Date: 19/05/06
Job No.:	42608	Checked:	Date:

Stage 3

Pre-Development

Hardstand/Roof area (ha)	0
Other (pervious) area (ha)	0.4581
TOTAL	0.4581

Post-Development

Hardstand/Roof area (ha)	0.2939
Other (pervious) area (ha)	0.1642
TOTAL	0.4581

Hydrology	
2 year	84 mm
10 year	134 mm
100 year	195 mm

# TP108 - POND DESIGN (EXISTING DEVELOPMENT SCENARIO)

Project: *West Coast Raod* By: WL Date: 19/05/06  
 Location: 42608 Checked: Date:

## 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (hectares)	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Pasture</i>	74	0.4581	34
	Subtotal for Pervious Areas		0.4581	34
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	0.000	0
	Subtotal for Impervious Areas		0	0
	Totals		0.4581	34

\* from Table 3.3

$$\begin{aligned} \text{CN (weighted)} : & \frac{\text{total product}}{\text{total area}} = \frac{34}{0.4581} = 74 \\ \text{Ia (weighted)} : & \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.4581}{0.4581} = 5.00 \text{ mm} \end{aligned}$$

## 2. Time of Concentration

$$\begin{aligned} \text{Channelisation Factor : } C &= 1 \quad (\text{from Table 4.2}) \\ \text{Catchment Length : } L &= 0.044 \text{ km (along drainage path)} \\ \text{Catchment Slope : } S_c &= 0.158 \text{ m/m (by equal area method)} \\ \text{Runoff Factor R : } \frac{CN}{200 - CN} &= 0.59 \end{aligned}$$

$$\begin{aligned} \text{Time of Concentration : } t_c &= 0.14 C L^{0.66} R^{-0.55} S_c^{-0.30} = 0.17 \text{ hrs} \\ \text{SCS Lag for HEC-HMS : } t_p &= \frac{2}{3} t_c = 0.11 \text{ hrs} \end{aligned}$$

$$\begin{aligned} \text{3. Soil Storage Parameter : } S &= ((1000/CN) - 10) \times 25.4 \\ \text{Total} &= 89.2 \text{ mm} \\ \text{Pervious} &= 89.2 \text{ mm} \\ \text{Impervious} &= 5.2 \text{ mm} \end{aligned}$$

## 4. Average Recurrence Interval, ARI (yr) :

## 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$$

## 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \quad (\text{m}^3/\text{s})$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \quad (\text{mm})$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \quad (\text{m}^3)$$

	Storm #1	Storm #2	Storm #3
	2	10	100
	84	134	195
	0.29	0.41	0.51
	0.082	0.108	0.126
	0.032	0.066	0.113
Pervious	37.1	76.2	129.3
Impervious	79.1	129.0	190.0
Pervious	170	349	592
Impervious	000	000	000
Total	170	349	592

### TP108 - POND DESIGN (POST-DEVELOPMENT SCENARIO)

Project: *West Coast Road* By: WL Date: 19/05/06  
 Location: ## Checked: 0 Date:

#### 1. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area	Product of CN x Area
<i>Waitemata clay, Class C</i> <i>Waitemata clay, Class C</i>	Pervious Areas (List)			
	<i>Bush</i>	70	0	0
	<i>Cut faces</i>	74	0.1642	12
	Subtotal for Pervious Areas		0.1642	12
	Impervious Areas (List)			
	<i>Roads / paved</i>	98	0.294	29
	Subtotal for Pervious Areas		0.2939	29
	Totals		0.4581	41

\* from Table 3.3

$$\text{CN (weighted)} : \frac{\text{total product}}{\text{total area}} = \frac{41}{0.4581} = 89$$

$$\text{Ia (weighted)} : \frac{5 \times \text{pervious area}}{\text{total area}} = \frac{5 \times 0.1642}{0.4581} = 1.8 \text{ mm}$$

#### 2. Time of Concentration

Channelisation Factor : C = 0.6 (from Table 4.2)  
 Catchment Length : L = 0.044 km (along drainage path)  
 Catchment Slope : Sc = 0.158 m/m (by equal area method)  
 Runoff Factor R :  $\frac{\text{CN}}{200 - \text{CN}} = 0.81$

$$\text{Time of Concentration} : t_c = 0.14 C L^{0.66} R^{0.55} S_c^{-0.30} = 0.17 \text{ hrs}$$

$$\text{SCS Lag for HEC-HMS} : t_p = \frac{2}{3} t_c = 0.11 \text{ hrs}$$

3. Soil Storage Parameter :  $S = ((1000/\text{CN}) - 10) \times 25.4$

Total	=	30	mm
Pervious	=	89	mm
Impervious	=	5	mm

#### 4. Average Recurrence Interval, ARI (yr) :

#### 5. 24 hour Rainfall Depth, P<sub>24</sub> (mm), (from Appendix A)

$$\text{6. Runoff Index, } c^* : = \frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$$

#### 7. Specific Peak Flow Rate, q\*, (from Figure 5.1)

$$\text{8. Peak Flow Rate, } q_p : = q^* A P_{24} \text{ (m}^3/\text{s)}$$

$$\text{9. Runoff Depth, } Q_{24} : = \frac{(P_{24} - Ia)2}{(P_{24} - Ia) + S} \text{ (mm)}$$

$$\text{10. Runoff Volume, } V_{24} : = 1000 \times Q_{24} A \text{ (m}^3)$$

	Storm #1	Storm #2	Storm #3	Storm #4	Storm #5
Erosion	1/3 *2	2	10	100	
	34.5	28.0	84	134	195
	0.34	0.29	0.57	0.68	0.76
	0.066	0.048	0.109	0.130	0.145
	0.01	0.01	0.04	0.08	0.13
Pervious	7.3	4.7	37.1	76.2	129.3
Impervious	30.0	23.6	79.1	129.0	190.0
Pervious	012	008	061	125	212
Impervious	088	069	233	379	558
Total	100	077	293	504	771

# C A L C U L A T I O N S H E E T

Job No: 42608 By: WL Checked: \_\_\_\_\_ Date: 19/05/2006

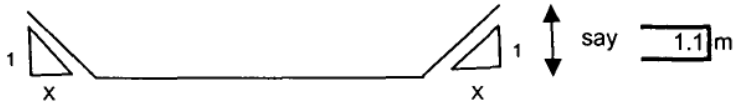
Project: West Coast Road Page: 1 of: 1

Subject: Stormwater Pond Sizing for Pond (Stage 3)



Water Quality Volume (WQV) = 180 m<sup>3</sup>

180 m<sup>3</sup>

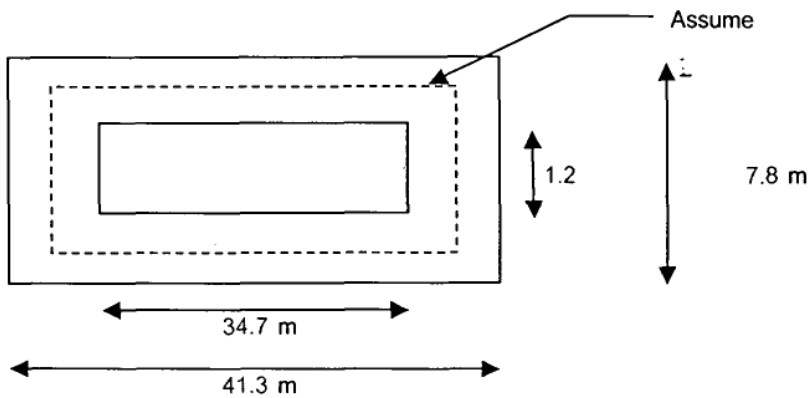


Area required = 164 m<sup>2</sup>  
Side slope: 1 : 3  
(1 : X)

Ratio:

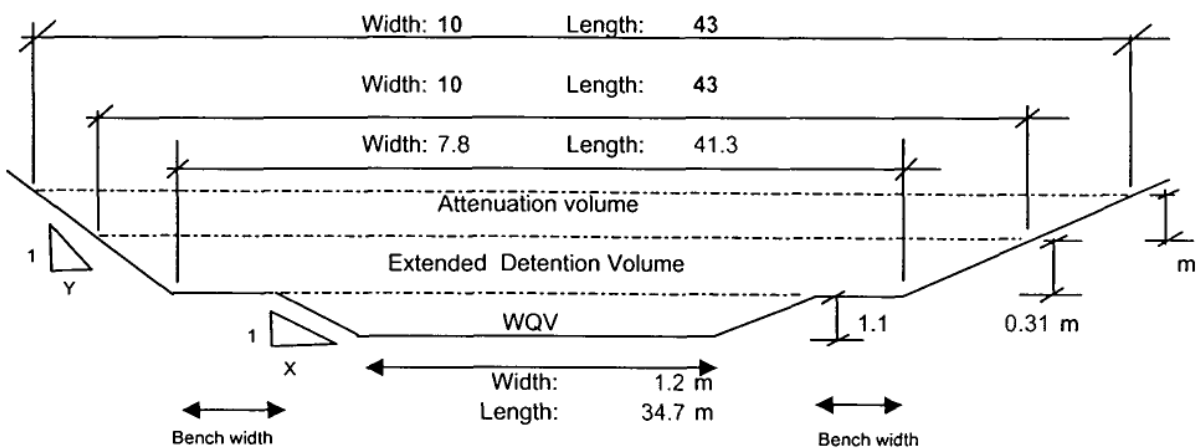
Width 4.5 m  
Length 38 m  
Area = 171 m<sup>2</sup>

OK



	Top	Bottom
Width	7.8	1.2
Length	41.3	34.7

Extended Detention storage = 100 m<sup>3</sup>



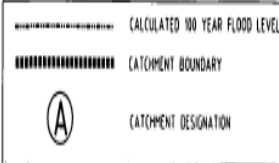
Bench Width: 0 m  
Side slope(1:Y): 1 : 3

Depth required: 0.31 m

CATCHMENT SCHEDULE

CATCHMENT	AREA (m <sup>2</sup> )	COMPOSITE C	DISCHARGE 10% AEP (lit/sec)	DISCHARGE 1% AEP (lit/sec)	DIFFERENCE
A	7141	0.35	73	111	38
B	4888	0.65	93	141	49
C	4338	0.65	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4300	0.65	83	126	43
G	2810	0.65	70	106	37
H	1143	0.65	22	33	11
I	1803	0.65	34	52	18
J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
M	2539	0.65	63	96	33
N	5095	0.65	97	147	51
O	3724	0.65	71	108	37
P	3064	0.35	31	48	16
Q	1262	0.65	24	36	12
R	1479	0.65	37	56	19
S	2075	0.65	39	60	21
TOTAL	67287		1046	1582	547

KEY



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CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**STORMWATER  
CATCHMENT PLAN  
(SHEET 1)**

	DATE	INITIAL
DESIGNED	JUNE 2008	FK
DRAWN	JUNE 2008	OW
CHECKED		
APPROVED	13/06/08	JP

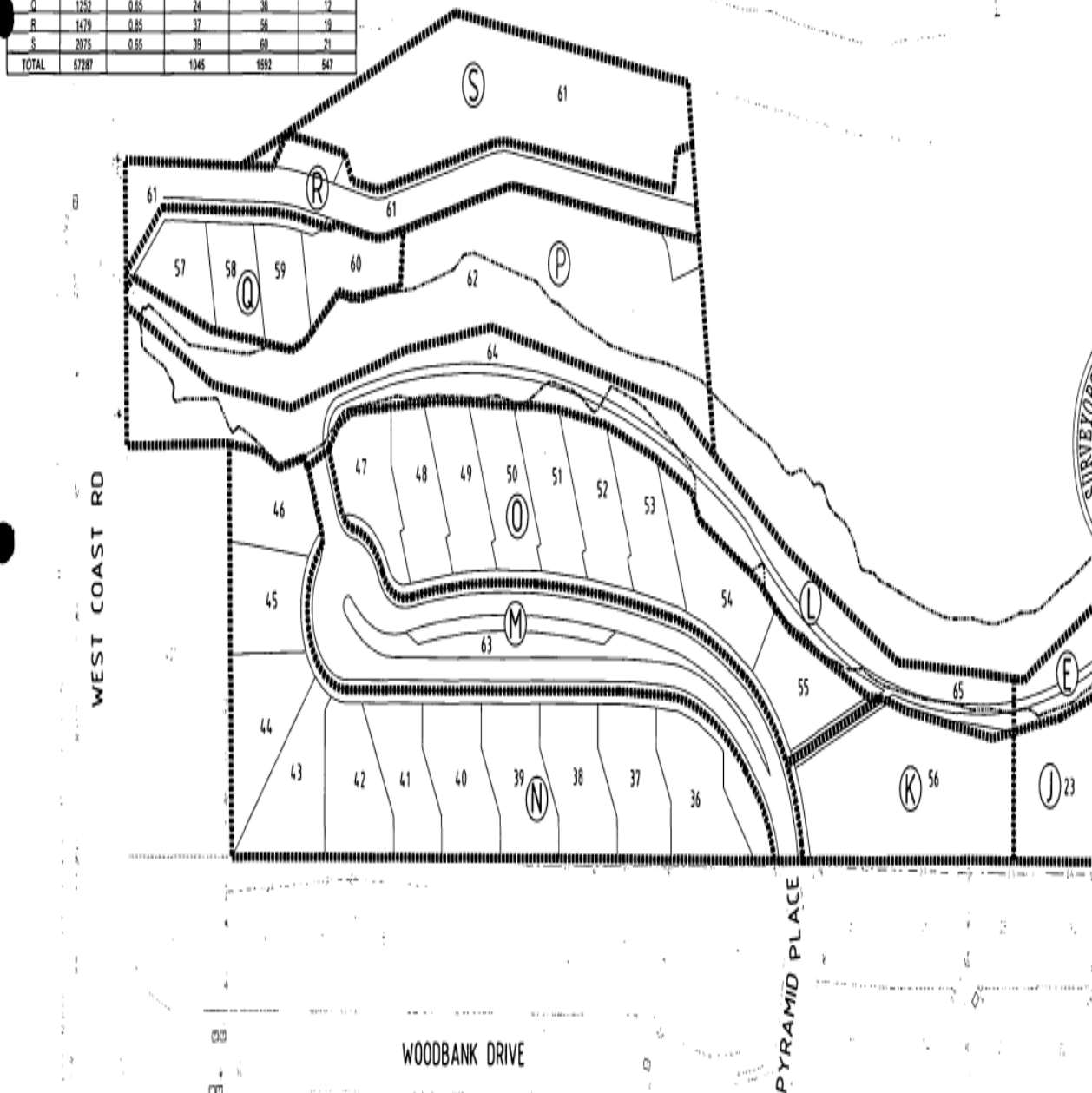
	SCALE (A1) 1:500	
JOB NUMBER 42608	DRAWING NUMBER C43	REVISION 

# KEY

	CALCULATED 100 YEAR FLOOD LEVEL
	CATCHMENT BOUNDARY
	CATCHMENT DESIGNATION

## CATCHMENT SCHEDULE

CATCHMENT	AREA (m <sup>2</sup> )	COMPOSITE C	DISCHARGE 10% AEP (litres)	DISCHARGE 1% AEP (litres)	DIFFERENCE
A	7141	0.35	73	111	38
B	4888	0.65	93	141	49
C	4338	0.65	108	164	56
D	3047	0.65	58	88	30
E	3427	0.55	55	84	29
F	4360	0.65	83	126	43
G	2810	0.65	70	106	37
H	1143	0.65	22	33	11
I	1803	0.65	34	52	18
J	840	0.65	16	24	8
K	1467	0.65	28	42	15
L	2795	0.55	45	68	24
M	2539	0.65	63	96	33
N	5095	0.65	97	147	51
O	3724	0.65	71	108	37
P	3064	0.35	31	48	16
Q	1252	0.65	24	36	12
R	1479	0.65	37	56	19
S	2075	0.65	39	60	21
TOTAL	57287		1045	1592	547



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CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**STORMWATER  
CATCHMENT PLAN  
(SHEET 2)**

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	GM
CHECKED	23/06/06	JP
APPROVED		

SCALE (A4)	1:500
JOB NUMBER	42608
DRAWING NUMBER	044
REVISION	



## **Appendix 11**

### **ARC Comprehensive Discharge Consent**



*Comprehensive Discharge Consent Application*

# **Parrs Stream Stormwater Management Plan**

**Waitakere City Council**



*Opus is an accomplished work,  
a creation, an achievement*



## *Comprehensive Discharge Consent Application*

# **Parrs Stream Stormwater Management Plan**

**Waitakere City Council**

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Date:             6 March 2003  
Reference:     3aw045.00  
Status:           Final 4

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## 1 Introduction

Opus International Consultants Ltd were commissioned to carry out a catchment analysis and stormwater study of the Parrs Stream catchment. The study had the following specific requirements:

- To define the catchment and principal sub-catchments
- To determine likely flood flows
- To investigate potential flooding problems
- To analyse and report on flood mitigation options
- To prepare a report and drawings identifying the flood hazard areas.

It is anticipated that this report may be used as the principal resource for:

- Obtaining a discharge consent for the catchment
- Determining the appropriate mode and level of catchment development
- Identifying flood hazards and ensuring appropriate development controls are implemented in flood hazard areas.
- Identifying necessary (or recommended) system upgrading requirements
- Identifying existing flood prone properties and proposing appropriate flood protection measures.

### 1.1 Background

This report concerns the Parrs Stream catchment, a 1.1 km<sup>2</sup> urban tributary of the Waikumete Stream in Glen Eden. At least one house in the catchment suffers flooding at present, and significant development is occurring which could worsen the existing situation. Ecowater have requested Opus to undertake a catchment study to identify potential problems, propose solutions and develop a long-term management plan for the catchment.

Waitakere City Council has a statutory duty to manage stormwater under the Local Government Act, 1974, the Building Act, 1991, and the Resource Management Act, 1991. Responsibilities include minimising the adverse effects of flooding from both land development and building activities. Ecowater is the local authority business unit that manages stormwater activities on behalf of Waitakere City Council.

### 1.2 Previous Reports

The catchment has been partially investigated in two previous stormwater reports, the first by Hugh Fendall Consultants Ltd in September 1989, "*PHP Trust Subdivision, West Coast Rd, Oratia Stream Flow Calculations*", and the second a more recent investigation by N S Chandler, Consulting Engineer, for a proposed 13 lot subdivision in Selak Place for Linx Developments Ltd. As the titles suggest the two studies were principally related to managing stormwater from proposed subdivisions.

A further report was prepared by Worley Consultants Ltd in March 1993 titled "*Henderson Creek South Catchment - Simple Hydrological Catchment Study*". The report assessed flood flows and pipe/channel capacities throughout the Henderson Creek South catchment, which includes the Parrs Stream catchment.

### 1.3 Planning Framework

The Waitakere City Council Proposed District Plan was proposed in October 1995 and re-issued in December 1998, updated to include the results of Council decisions to date and cross-referenced to indicate outstanding appeals.

The catchment is predominantly zoned 'Living', which permits medium-density residential development. 89 Ha (82%) of the catchment has this zoning, of which approximately three-quarters is presently developed. Other significant land uses are 'Reserve' (14.4 Ha or 13%), with 11 Ha of Parrs Park being the most significant component; and 'Special' (5.2 Ha or 5%) which covers the marae.

The Proposed District Plan requires the preservation of a riparian margin (7 m each side) for the full length of Parrs Stream from 70 m below Solar Rd to its confluence with the Waikumete Stream.

## **2 Catchment Area**

### **2.1 Catchment Description**

The Parrs Stream catchment is illustrated on figure 1. The catchment comprises two tributaries: the main creek which rises in the head of the gully, above Solar Rd, and a subsidiary catchment which collects stormwater from the Glengarry Rd/Nicholas Ave area. The two tributaries merge below West Coast Rd for the final 260 m to their confluence with the Waikumete Stream.

The main Parrs Stream flows as a natural stream for 1.3 km from 120 m below Solar Rd to the Waikumete confluence. Two road crossings are culverted, Milan Drive with two 1600 mm pipes and West Coast Rd with twin 1800 mm pipes. The urban areas around the sides and head of the valley are fully reticulated with pipes discharging to the stream.

The subsidiary catchment comprises a mixture of piped and open channel sections.

### **2.2 Historical Flooding**

Regular complaints of flooding have been received from the owners of 426 West Coast Rd. Mr and Mrs Bree were interviewed during the preparation of this report. They report that the Parrs Stream (which runs along the side boundary of their property) overflows into their back yard about six times per year. They have lived on the property for more than 30 years but noted that flooding has become significantly worse in recent years due, they believe, to the additional subdivisional development upstream. Typical flood events spill into and contaminate an in-ground swimming pool, and more serious events flood into a basement shower/toilet and garaging. There are no habitable areas at this level, with all living accommodation on the floor above.

### **2.3 Stormwater Issues Identified through Public Questionnaire**

A number of other stormwater and flooding problems were identified by means of a questionnaire, which was circulated to residents in the catchment (refer sample appended). Quite a few respondents drew attention to relatively minor nuisances, which have been forwarded to Waitakere City for appropriate attention. A small number were more significant and deserve attention here.

The owner of 24 Milan Drive noted that the stream that used to run along his back boundary appears to have been diverted a few years ago by a neighbour. The diversion encroaches onto his property and some erosion is occurring. The stream reportedly floods beyond its banks with every significant rainfall (approximately three times per month), with the stream rising to peak levels in about 10 minutes.

The owner of 83 Brunner Road reported an increased amount of debris within the stream and higher flooding levels since the completion of the Milan Drive subdivision. Observations at the property showed an area has been filled on the Milan Drive side of the stream to level the sections adjacent to the stream. In places there is uncovered soil which could be prone to erosion during the flooding of the stream. Monitoring of the neighbourhood and control of building activities within the flood plain are recommended.

75A Brunner Road is also adjacent to the stream, and reports similar problems. This section is an example of a subdivided section placing houses immediately adjacent to the stream and associated floodplain. The ground around the property is continuously wet due to rising of the stream and overland flow from the houses above. Since the house is piled, the floor is clear of any immediate risk of flooding.

The property owner at 158 Solar Road reported stormwater problems occurring every time it rains. The property is situated in the bottom of the gully and there is no adequate drainage to capture the amount of runoff to the area. On inspection the ground around this house was found to be extremely wet, with water sitting on the ground surface. Once again the house is on piles and has no immediate risk of flooding.

The walkway between Maywood Cres and Solar Rd and adjacent properties suffer ponding due to the existing ground profile which effectively 'dams' the overland flow path. When the overland flow path operates water will pond to approximately 1m depth before flowing clear. No dwellings are at risk of flooding. This nuisance effect could be mitigated if necessary by localised earth filling.

## **2.4 Future Development**

It is anticipated that most remaining vacant 'Living'-zoned areas will be developed over the next 10-15 years. A site in the lower catchment has been proposed for a future Wananga (university), which may result in perviousness equivalent to a medium-density residential area. Future development of Parrs Park is not expected to significantly affect the level of perviousness of that site.

The nature of the existing stormwater reticulation is expected to change little as a result of future development (i.e. new development areas will be fully reticulated but the main stream will remain open).

## 3.1.3 Results

Table 1: PEAK FLOWS IN THE PARRS STREAM CATCHMENT

Location	Full Development Peak flow <sup>2</sup> (m <sup>3</sup> /sec)		Capacity of Existing Culvert (m <sup>3</sup> /sec)	Pipe Diameter (mm)
	1% AEP (100 year ARI)	20% AEP (5 year ARI)		
Outflow subcatchment A (Solar Rd)	7.2	3.6	4.0	2 x 825 dia
Outflow subcatchment A - B (Milan Dr)	12.2	6.3	14 <sup>3</sup>	2 x 1600 dia
Outflow subcatchment A - C (West Coast Rd)	16.2	8.2	14 <sup>3</sup>	2 x 1800 dia
Outflow subcatchment E (West Coast Rd)	3.3	1.7	1.2	525 dia
Outflow subcatchment E + F (confluence Parrs Stream)	6.6	3.0		Open channel
Outflow subcatchments A - F (confluence Waikumete Stream)	24.2 <sup>4</sup>	11.0		Open channel

<sup>2</sup> Based on full development to existing District Plan limits with no significant alteration to the stream channel.

<sup>3</sup> Assumes culverts headed up to the point where flooding of buildings is imminent. Assumes no blockage of culverts occurs.

<sup>4</sup> This figure may be compared with 26.0 m<sup>3</sup>/s for the 1% AEP storm with cleared channel conditions for full development (ref *Oratia Stream Flood Modelling Review* (draft), Opus International Consultants, Sept 1999). Refer also discussion in Section 3.3. Principal differences arise from the following:

- The Flood Modelling Review used the new TP108 methodology whereas this study has been based on the older TP19 methodology. TP108 was not available at the time of commencement of this study.
- This report assumes a catchment imperviousness of 35% for the fully developed residential areas and 30% for the overall catchment. By comparison the Flood Modelling Review assumes an overall imperviousness of 46%.
- Much of the land below West Coast Rd is zoned for reserve, which is expected to remain roughly 10% impervious. The remaining land is now zoned 'living'. An overall imperviousness of 22% has therefore been assumed in this study for the land below West Coast Rd compared to 19% assumed in the Flood Modelling Review.
- The Parrs Stream catchment modelled in the Review is 44% larger than that considered in this study, and includes significant areas draining direct to the Waikumete Stream from both sides. This reflects the differing focus of the two studies - this study considering the catchment that physically drains to Parrs Stream, while the Review considers all flows entering between nodes in the Waikumete Stream.
- While the Flood Modelling Review assumed a larger catchment area, it also assumed a cleared channel condition, whereas this study assumes the present level of riparian vegetation will continue. The effects of area and channel condition have tended to cancel out, yielding a similar 1% AEP flow to this study.

### 3.2 Calculation of water levels

#### 3.2.1 Methodology

Hydraulic modelling carried out for this study was limited to an assessment of pipe and culvert capacities, and limited 'HecRAS' analysis of surveyed open channel sections adjacent to the Bree property. HecRAS is a non-dynamic river analysis programme developed by the US Army Corps of Engineers and predicts top water levels for nominated flow rates.

Flood hazards identified in this report have been principally based on reported flood problems, together with the results of the analyses above. Flood hazard areas have been derived by extending the potential flood or overflow levels using contour plans and field observations, and making some allowance for backwater effects.

#### 3.2.2 Flood Hazard Maps

The inferred flood hazard areas are illustrated on the flood hazard map appended as figure 2. The maps principally cover the main channel and do not purport to identify every isolated case where flooding may occur due to blockage, lack of primary system capacity, etc.

The flood hazard map appended identifies areas where a potential flood hazard exists. Further detailed analysis will be required to determine the precise flood level and footprint of flooding at any given spot.

### 3.3 Flooding in the Waikumete/Oratia Stream Catchment

This report does not deal in detail with flooding in the Waikumete/Oratia Stream system downstream. Flooding in that system has been studied in a number of reports, including the *Oratia Stream Catchment Management Plan* (Opus, 1995).<sup>9</sup>

This present report is based on the philosophy that peak flow detention in the upper Oratia will be beneficial for management of the Waikumete/Oratia system and that detention in the lower Oratia will be detrimental. Parrs Stream is located in the mid-Oratia, where detention can be either beneficial or detrimental, depending on the device configuration and storm characteristics. This was borne out by a specific study carried out in a neighbouring catchment, the Tangatu Stream (Opus, 1999), which joins the Waikumete approximately 600m upstream of Parrs Stream. That study found that peak flows actually *increased* slightly downstream if detention was installed in the tributary. The study found that detention was only likely to be an appropriate management option in the mid-catchment if *all* tributaries were so fitted. In the case of Parrs Stream and several other tributaries in the vicinity there are few sites easily amenable to detention. Since the modelling indicated that detention needs to be on an 'all or nothing' basis, we concluded that detention in the middle catchment is not appropriate.

Notwithstanding these comments it is appropriate to install where feasible detention to restrict post-development peak flows in small storms (say up to the 50% AEP storm) to their pre-development levels. Such measures will be beneficial by reducing stream erosion, but will not significantly alter flooding in larger storms.

## 4 Assessment of Existing System

### 4.1 Pipe Reticulation

The catchment drainage generally comprises piped drains serving most lots (most are less than 30 years old), and discharging to the main drain which is piped upstream of Solar Rd and open stream downstream. The pipe systems are generally relatively steep.

Pipe capacities for the catchment have been assessed previously by others (ref. Worley Consultants Ltd, 'Henderson South Catchment – Simple Hydrological Catchment Study', 1993). Worley's work has not been re-calculated, however spot checks were made of their spreadsheet analysis, which was found to be generally satisfactory. 'Possible flood hazard' areas identified by Worleys were visited and inspected, and have been reproduced where appropriate on the flood hazard maps appended.

The Worley report found that most of the piped reticulation was of sufficient capacity, however some links are inadequate for the 20% AEP (5 year ARI) flows. Works recommended by Worleys that remain outstanding are as follows:

Stormwater line	Location	Section between manholes	Diameter 1995	Required diameter	Cost (1995 value)
Line WX	Subcatchment E drain below orchard	5-10	< 700	1050	\$71,424 <sup>5</sup>
Line WXB	West Coast Rd/Parrs Cross Rd intersection	5-10	225	375	\$16,450
Line WQ	Tributary adj Brunner Rd	30-35	225	375	25,380
Line WH	Tributary above Solar Rd	15-20, 30-35, 35-WW60	225	450-600	63,850
Total:					\$179,099

The main drain at Solar Rd is conveyed by an 825mm dia pipe. At a gradient of 5.8% the pipe has a capacity of 4 m<sup>3</sup>/sec, which meets the 20% AEP design standard. Below Solar Rd the gradient reduces to 2.2%. Here the pipe has been duplicated recently to provide additional capacity.

### 4.2 Open Channel above Milan Drive

Between the pipe outlet 120 m below Solar Rd and Milan Dr the 310 m of open channel has an average slope of 1.4%. The gully floor is relatively wide but the channel becomes more incised near Milan Drive. In places urban landscaping approaches the bank-tops, while in other places

<sup>5</sup> Upgrading of line WX is considered further in section 6.6.

the flood plain is clothed in bush or scrub. Above the Milan Dr Reserve the channel is less incised, and floodwaters regularly spill onto private property, even beyond the 10 m wide drainage easement. In this reach some small-scale reclamation has occurred, which causes increased depth and frequency of flooding together with minor erosion.

A sample cross section was surveyed above Milan Drive where the stream is relatively incised. Whilst it is erroneous to assume that the cross-section is representative of the entire reach, a simple Mannings analysis indicates that the channel at that point can convey the 1% AEP flow at a depth of approximately 1.7 m. At this depth damaging flooding is unlikely to occur.

#### **4.3 Milan Drive Culverts**

Parrs Stream crosses Milan Drive in twin 1600 mm dia culverts. No habitable floors of upstream houses were identified as being below road level, however one garage/basement was noted 0.7 m below road level.

The culverts have a capacity of 14 m<sup>3</sup>/sec assuming no blockage and heading up no higher than the garage floor level noted. This is sufficient to pass the 1% AEP flood. Assuming 50% blockage occurs the culverts have a capacity of 7 m<sup>3</sup>/sec, which is equivalent to the 10% AEP storm flow.

There is therefore no appreciable risk of flooding to any building adjacent to the Milan Dr culverts provided the culverts remain unblocked. If blockage occurs one non-habitable floor may be put at risk.

#### **4.4 Open Channel Between Milan Drive and West Coast Rd**

Several sample cross-sections were surveyed between Milan Drive and West Coast Rd. The channels at these points were evaluated by Mannings' analysis, which indicates the channel is capable of transmitting the 1% AEP flood flow at depths of up to 2.0 m and surface widths of up to 16 m.

The Bree property at 426 West Coast Rd represents a significant constriction to stream flow. Here the existing open channel runs down the side boundary. The back yard is only approximately 900 mm above streambed level at the upstream boundary, and sand-bags have been installed along the fenceline to exclude floodwater. The sand-bagged stream has an assessed capacity of only about 25% of the 5 year ARI (20% AEP) storm event, which explains the frequent inundation of the back yard and occasionally the basement area of the house.

#### **4.5 West Coast Rd Culverts**

Parrs Stream passes under West Coast Rd in two 1.8 m diameter culverts.

Two houses immediately upstream of the culverts (numbers 424 and 426 West Coast Rd) have upper (habitable) floor levels of 380 and 480 mm respectively above the road centre-line. While this represents a less than desirable level of freeboard, any potential over-land flow over the road

will be broad and shallow, and the upper floors should remain free of flooding in any reasonably foreseeable event.

The basement/garage areas of the two houses have floor levels approximately 0.5 and 1.7 m respectively below the road centre-line, which for No 426 is only 2.6 m above culvert invert level. The culverts have a capacity of approximately  $14 \text{ m}^3/\text{sec}$  at a head-water level of 2.6 m (i.e. where flooding of No 426's garage/basement is imminent), *provided they remain unblocked*. This is approximately equivalent to a 2% AEP storm flow.

With bush areas and urban back yards along the stream banks it is not possible to eliminate the debris blockage threat altogether. The large diameter (1800 mm) culverts are however less prone to blockage than smaller sized pipes. Assuming 50% loss of inlet capacity due to blockage the culverts can still convey approximately  $9 \text{ m}^3/\text{sec}$  (i.e. better than the 20% AEP flood flow) without garage/basement flooding.

It can therefore be concluded that the garage/basement of 426 West Coast Rd is flood-prone in a 1% flood event without culvert blockage, and smaller events if blockage occurs.

#### 4.6 Open Channel Below West Coast Rd

Below West Coast Rd the channel slope decreases to 0.5 – 1.0%. The open channel becomes wider and slower, meandering through farmland. After traversing a pond section it narrows again between the confluence of subcatchments E & F and the Waikumete Stream. The channel is weedy in parts, and the banks contain significant brushwood.

One sample cross section was surveyed below West Coast Rd. This should not be considered representative of the entire reach, which varies as described above. The channel at the sample section had a slope of 0.5%, and was capable of transmitting the 1% AEP flow at a depth of approximately 2.6 m and a surface width of approximately 18 m.

#### 4.7 Subcatchment E

Between Glengarry Rd and West Coast Rd the previously open drain has been piped (or possibly only filled with shells to create a subsoil drain) through an orchard. No manholes are evident, leading to the conclusion that any piping has been carried out informally. The pipe system below the orchard has an assessed capacity of  $0.6 \text{ m}^3/\text{sec}$  compared to the 20% AEP (5-year) flow of  $1.7 \text{ m}^3/\text{sec}$ . Upgrading is recommended.

Excess flows will follow a defined gully through the orchard, and then flow across numbers 452-458 West Coast Rd. The crest level of West Coast Rd is higher than the ground level at number 452 so that nuisance ponding is likely in larger storms (typically less than 200 mm depth). Once stormwater heads up sufficiently it will flow across West Coast Rd and return to the open channel. No dwellings appear to be at risk of flooding. One solution would be to construct an overland flowpath across number 456b and down the concrete driveway to West Coast Rd, together with upgrading the stormwater pipe. Alternatively a pipe capable of conveying the 1% AEP flow can

be installed including an adequate, non-blocking inlet structure. A pipe of approximately 1050 mm dia will convey the 1% AEP flow.

The culvert inlet at Glengarry Rd is substandard, and a short reach between the culvert outlet and the (assumed) pipe inlet in the orchard was badly blocked at the time of inspection. Channel clearing is urgently required. It is recommended that a fully piped linkage should be constructed with manholes as appropriate.

Below West Coast Rd subcatchment E returns to open channel flow, passing through three culverts adjacent to a Maori school (Wharekura). The upper two of these carry paved driveways serving the school site, which form substantial dams to flow. Excess flows will pond deeply and spill over the upper driveway without significant effect but the overflow level of the second driveway is higher than three adjacent buildings, which may flood. The situation is made worse by an orifice plate that has been installed on the second culvert to create an extended detention pond upstream, for which ARC consent number 15975 was issued in 1997. The 720 mm dia orifice plate/1200 mm pipe system will convey flows up to approximately the 20% AEP flow. We understand that this device was installed (in the absence of catchment management plans for the tributary) to ensure pre-development flows were maintained after development of the Wharekura. Options for modifying this culvert/driveway are presented in section 6.6 below.

The third (downstream) culvert is also inadequately sized but has a lower overflow level. Excess flows will overtop the embankment and return to the open channel downstream without causing further flooding.

It is recommended that prior to further significant development of subcatchment E the existing pipe drainage system above West Coast Rd is located, its size and capacity checked, and any necessary upgrading carried out.

## 5 Stormwater Quality Issues/Opportunities

### 5.1 Water Quality

From a water quality point of view Parrs Stream has a number of factors in its favour. The main stream is largely natural and open, with remnants of native riparian vegetation. While the Parrs Stream catchment is completely urbanised, it is fortunate in that it contains no industry. The residential development that makes up most of the catchment will have a relatively smaller impact on water quality, apart from the initial construction phase. West Coast Rd is highly trafficked, and represents perhaps the greatest pollutant source. The opportunity should be taken in conjunction with development of land to the north to divert as much road runoff as possible into suitable treatment devices.

The main stream channel below West Coast Rd has the potential to be developed as a riparian reserve (say 30m from each stream bank), which will serve an ecological and amenity function. Among the benefits provided by such a reserve is the additional shading of the stream, which will help maintain water temperatures and will benefit in-stream biota. Recent international research has identified the riparian reserve as a critically important stormwater management practice, as shown by the following extract:

Retention of a relatively wide, continuous riparian zone in forest cover or wetlands was shown to be the BMP of greatest potential and versatility among those investigated here. This practice may also be the easiest to accomplish logistically, the least costly and, accordingly, the most cost-effective. In newly developing areas riparian zones can be isolated from development, along with their associated streams, which are not going to be built over in any event. In already developed landscapes riparian zones are often the most free of development and could more easily be bought and put into protective status than upland areas. Riparian retention fits nicely with other objectives, like flood protection and provision of wildlife corridors and open space. Land and water management agencies should give top priority to securing and protecting existing high quality riparian buffers, enhancing or restoring degraded but not developed ones, and getting into protective status developed ones and then removing development and upgrading.<sup>\*</sup>

No sampling or analysis of stream water quality was undertaken in the present study. During Opus' walkover assessment water clarity was observed to be fair, although some discolouration can be expected after heavy rainfall. There is a significant debris and litter problem (eg. prunings, furniture, etc.), which is mainly attributable to storage and dumping of materials on the stream bank. Like many urban New Zealanders, residents along the riparian margins of Parrs Stream are not particularly good stewards of their stream, choosing to use it for refuse disposal rather than understanding it as an asset. Public education is needed in this area.

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<sup>\*</sup> Horner, Richard, R and Christopher W May, *Regional Study Supports Natural Land Cover Protection as Leading Best Practice for Maintaining Stream Ecological Integrity* in Proceedings of First South Pacific Conference, Comprehensive Stormwater and Aquatic Ecosystem Management, 1999; pp. 233-247.

Some relatively minor erosion is occurring in the stream bed and banks, particularly in the steeper sections above West Coast Rd. Stream velocities are sufficiently high to indicate that erosion will be a continuing problem. The corridor should be monitored and localised protection works implemented as necessary.

## 5.2 Ecological Assessment

At the time of writing no formal ecological assessments have been undertaken in Parrs Stream, however inferences can be made from surveys carried out in the Waikumete Stream nearby<sup>7</sup>.

Native Fish surveys have been undertaken in the Waikumete Stream above and below Parrs Stream in March 1998 (Bioresarches) and January 1999 (Field Studies). Notable in these studies (and from surveys of the Oratia Stream also) is the presence of the rare native freshwater crab *Halicarcinus lacustris*. This crab seems to be quite common in the Oratia and Waikumete subcatchments, particularly in any areas where there is rocky substrate, yet has not been found anywhere else in the Auckland region. The crab, while tolerant of high levels of settled sediment, is likely to be adversely affected by increased suspended sediment levels and increased water temperatures.

In addition to these crabs, Crans Bully, Redfinned Bully, common bullies, shortfinned eels and longfinned eels were found in the Waikumete Stream. Snails and damselflies were also found in the stream.

It is likely that some or all of these species can also be found in the Parrs Stream.

Notable in their absence from all areas surveyed in the Waikumete Stream are the banded kokopu, a species that is frequently found in Waitakere streams. It is likely that the lack of shading of the stream is the major cause of their absence, and being a fish which migrates up and down streams, could recolonise the area should suitable shade be re-established.

The two culverts on the main stream may create a significant barrier to fish passage. Consideration should be given to installing fish passes in the culverts to assist migration.

## 5.3 Stormwater Treatment

The main stream catchment above West Coast Rd is largely developed and offers few easy opportunities for stormwater treatment. In this area options such as regular cesspit cleaning, cesspit liners, and/or end of pipe solutions such as gross pollutant traps, CDS units or small forebays may be appropriate. The natural stream channel and riparian planting should be retained and enhanced where possible.

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<sup>7</sup> Acknowledgment is made to L Easton, WCC, for information in this section.

Below West Coast Rd the land is presently undeveloped and the options are wider. On-line ponds are not appropriate in the main stream channel because they will destroy ecological features, however there is space to construct TP10-standard devices off-line. There is no obvious single, ideal site so the optimum treatment device, layout and location will be best determined in conjunction with the developers of the land concerned. The devices should be configured to treat as much runoff from West Coast Rd as possible.

The large tributary (Subcatchments E & F) is heavily modified and should provide a suitable location for an on-line pond. A pond (or other treatment device) should be constructed in the gully behind 456 West Coast Rd when the remaining vacant land is developed. (Site constraints will probably limit the pond size to about 50% removal efficiency at best, or excavation and dam height will become excessive.)

A pond has already been partly formed by the driveway serving the wharekura below West Coast Rd, but the floor levels of the adjacent buildings limit the available storage. A small in-line treatment pond capable of achieving an efficiency approaching 50% may be feasible in this location. Such a pond may not be altogether appropriate immediately adjacent to a school.

## **6 Flood Management Options**

### **6.1 Level of Flood Protection**

For all new buildings in the catchment WCC policy prohibits construction of any new habitable or ancillary building within the 1% AEP (ie 100 year) flood plain. Although the 1% flood plain has not been defined by this study, the main channel of the Parrs Stream is well defined, and the areal extent of flooding does not vary greatly with different sized flood events.

The minimum standard of flood protection for works requiring a Building Consent is laid down by the Building Act as the 2% AEP flood level. This will apply to all new buildings and alterations, and also to flood protection works which may require a building consent (eg house raising).

The following options are available to control flooding or mitigate the effects of flooding in the Parrs Stream catchment:

### **6.2 Controlling New Development in Flood Prone Areas**

WCC's current policy of prohibiting development within the 1% AEP flood plain should continue. This plan provides some guidance into the likely extent of the 1% AEP flood plain. In cases of doubt the applicant should be required to commission his own flood study to investigate the specific local issues.

### **6.3 Flood Protection for No 426 West Coast Rd**

Options for mitigating the nuisance flooding at 426 West Coast Rd include the following:

- Do nothing
- Increasing channel capacity
- Concrete lining the drain
- Gabion lining the drain
- Piping the drain
- Floodwalling of at-risk property with or without channel widening
- House raising or modification

One major advantage of open channel solutions over piped drains is that they are not limited by entry capacity. Flow can join the stream anywhere along its length, and also rejoin the stream immediately downstream of any blockage or constriction.

### 6.3.1 Do Nothing

This is the option against which all other management options must be compared. To do nothing will result in continued flooding of the back yard and pool area on a regular basis, causing considerable nuisance but little monetary loss. The basement/garage will flood periodically in major storms, causing minor losses. There will also be occasional major erosion episodes that will require reconstruction of the yard area and fences at considerable cost.

The house is currently listed on Council's flood hazard register, which will potentially reduce its market value.

### 6.3.2 Increasing channel capacity

For an unlined channel a trapezoidal cross section of approximately 20 m total width will be required (ie a base width of 1.0m, side slopes of 1:4 max and a depth of 1.2m). Such a channel would require substantial earthworks (approximately 600 m<sup>3</sup>) and encroach markedly on neighbouring properties to the extent that at least one property would have to be purchased outright.

Construction costs are detailed below.

### 6.3.3 Piping of Stream

Two piping options are available:

- Piping to accommodate the 5% AEP flows with an overland flow path for the remainder, or
- Piping to accommodate the 1% AEP design flow.

For the 5% option a 1600 dia pipe will suffice, together with a trapezoidal overland flow channel 8m wide and 0.9 m deep. Since the open channel will normally remain dry it is felt that land purchase may not be necessary however a suitable easement would be prudent. Since the overland flow channel will remain generally along the line of the existing stream, the pipe will need to be constructed alongside the swimming pool in the rear of No 426, with the attendant expense and risk of damage to the pool.

The other option is to convey the entire 1% AEP flow within the pipe system. For this option two 1500 mm dia pipes will be required, with appropriate attention to the inlet structure to minimise the risk of blockage. The pipes could be laid generally within the existing stream corridor and no additional land is expected to be required. In fact there would be a net gain of usable land for the adjoining owners.

Costs associated with the two pipe options are detailed in the table below.

#### 6.3.4 Concrete Lining of Stream Channel

A concrete channel of 2.1 m base width, 1.2 m depth and 4:1 side slopes is sufficient to convey the 1% AEP storm flow. Such a channel could be located within the existing stream corridor with minimal impact on the adjoining properties. Channel velocities will be high and fencing is considered essential. Concrete lining is not an 'eco-friendly' solution and is not therefore a preferred option

Costs associated with the channel lining option are tabled below.

#### 6.3.5 Gabion Lining of Stream Channel

A gabion-lined channel approximately 8m wide by 1.5 m deep is capable of conveying the 1% AEP flow. This width of channel will encroach on existing properties by up to 6m, requiring land to be purchased or easements to be taken. Gabion costs are tabled below

#### 6.3.6 Flood Walling

426 West Coast Rd has been given some interim flood protection in the form of sand bags placed along the rear and side boundaries. While these may be effective in minor storms their effectiveness will be limited because:

- they are too low adjacent to the upstream boundary, and
- the channel capacity is inadequate causing even relatively small floods to back up and overtop the sand bags.

It is feasible to install flood walling along the side and rear boundaries of a sufficient height to keep floodwaters out. Flood walls are effectively retaining walls designed to retain water rather than earth. They must be designed to withstand the likely hydraulic loadings and their foundations must be secure against scour or undermining.

The height of flood wall required depends on the extent of flood protection which is required (1%, 10%, etc.) and the distance the wall is set back from the stream edge. A wall which is set back 3.0 m from the top of banks will provide a greater flow area than one which is erected along the existing fence-line.

Two principal structural options are available:

- A concrete or masonry retaining wall can be constructed. If the wall is close to the stream or if it is intended to enlarge the stream by excavation then the wall will have to be founded below stream bed level. If the wall is more distant from the stream then a shallow wall footing may be feasible in conjunction with piling. Flood events will be of short duration and the ground is unlikely to become fully saturated, however velocities may be high and there is potential for undermining of the wall by scour or erosion.
- Alternatively a close-boarded timber retaining wall could be installed, utilising cantilevered poles, with the same provisos relating to distance from the stream as above.

The available set-back of the flood-wall is limited by the location of the existing in-ground swimming pool. In discussion with the owners it was determined that a walkway of at least 1m is necessary around the pool inside any flood wall. This will limit the available set-back to between 0.5-1.0 m inside the existing fenceline at this point as shown on the plan appended. On this alignment the wall will require a crest level of RL 29.06m (approximately 1.75 m above yard level) adjacent to the back boundary, reducing to RL 28.0m (0.7m above yard level) adjacent to the carport. A wall of these dimensions should exclude the 1% flood from the rear yard (inclusive of 500mm freeboard) but will cause a rise in flood levels of approximately 210 mm in the 5 year ARI flood event, and 540 mm in the 100-year event, outside the cordon (particularly above the property in the Wheaton PI subdivision). This level of effect is not expected to cause flooding to any adjacent dwelling, although landscaped areas will be inundated more regularly.

Waitakere City have nominated minimum floor levels for future houses in Wheaton PI as follows:

Lot 5, DP190863	29.30m
Lot 6	29.45m
Lot 7	29.60m
Lot 8	29.75m
Lot 9	29.90m

These restrictions are appropriate and should remain.

In order to protect the basement/garage area of 426 West Coast Rd in the 1% AEP event the RL28.0 m crest level must be carried through as a wall or bund to link up with the West Coast Rd embankment. Special provisions for draining the area inside the flood-wall cordon will be required.

Land acquisition and access for construction will be subject to negotiation with the owners.

#### 6.3.7 Flood Walling and Enlargement of Channel

Another flood-walling option which was investigated comprised building a flood wall behind the stream bank and enlarging the channel by excavating the material on the stream side of the wall down to bed level. Since the stream channel is increased the amount of set-back can be reduced. For example a wall set-back 1.5 m from the top of bank will bring about a flood level *reduction* of approximately 200 mm for the 5 year and 10 year ARI storms. Even the 100 year ARI flood level will increase by less than 150 mm.

The flood walling required under this option will be correspondingly lower (1.3 m above yard level), but since the wall must be founded at or below stream bed level, construction costs will in fact be greater. Once again flood walls can be constructed from either timber, or reinforced concrete. A wall or earth bund will still be required through the front of the property with a top level of RL 28.0 m to protect the garage/basement from the 1% AEP flood event.

The disadvantage of this option is the resultant modification of the stream channel, which is undesirable from an ecological point of view. The existing palm and totara trees near the upstream boundary of No 426 will also require removal.

Land acquisition and access for construction will be subject to negotiation with the owners.

#### **6.3.8 House-Raising**

Since the type of flooding experienced at 426 West Coast Rd is generally nuisance-type flooding to yards and non-habitable areas which causes only minor damage, house raising is not considered an appropriate flood mitigation option. A completely new suspended lower floor would need to be constructed beneath the raised upper floor, at considerable expense. These works would provide no relief to the regular nuisance flooding of the yard and pool area.

#### **6.3.9 Purchase and Removal**

Purchase and removal of the house at 426 West Coast Rd is only considered appropriate in conjunction with stream works and this option is therefore considered under 'Increasing channel capacity' above.

#### **6.3.10 Purchase/Alteration/Sale**

It may be feasible to purchase No 426 West Coast Rd, alter the house by removing the swimming pool and basement area, and then on-sell it (with appropriate hazard notes on the title). A valuer's appraisal would be required to determine the likely cost of this exercise. Nuisance flooding of the property will remain even after the works were completed.

#### **6.3.11 Compensation**

One option available is to compensate the owners for future flooding which will occur as a result of urban growth in the upper catchment. This option is not recommended because

- Such compensation may have to be significant
- The existing regular flooding will continue and worsen, and eventually try the patience of the owners, notwithstanding any compensation that has been made.

## 6.3.12 Summary of Costs

Table 3: Flood Mitigation Options for 426 West Coast Rd

(\$1000)	Stream Widening	Concrete Lining	Gabion Lining	Piping for 5% storm	Piping for 1% storm event	Flood walling (to contain 1% storm)	Flood walling and channel widening (1% storm)
Negotiation/land acquisition	236.5	2	45	10	4	16	14
Construction	47.5	113	85	110	143	81	96
Sub-total	284	115	130	120	147	97	110
Contingency (25%)	71	29	33	30	37	24	28
Total cost	355	144	163	150	184	121	138

## 6.4 Protection of Culvert Entries

It has been shown above that the existing culverts are generously sized provided they remain unblocked. Potential flood debris sources in the catchment include stream bank vegetation, and floatable material stored in the flood plain (e.g. timber, garden furniture, garden sheds, etc.). One non-habitable floor space will be put at risk through significant blockage of either the Milan Dr culverts or the West Coast Rd culverts. This risk can be reduced by constructing generous debris racks over the culvert inlets. Since the two culvert systems can still handle the 20% and 10% AEP flows respectively even with 50% blockage, such debris racks can be considered a lower priority.

## 6.5 Channel Clearing

Stream-bank vegetation clearance is an acknowledged means of controlling flood levels. Below West Coast Rd, for example, maintaining well-mowed channel banks will reduce the 1% AEP flood levels by approximately 200 mm. While hydraulically efficient, this is not consistent with water quality objectives as embodied in current ARC and WCC policies, which seek to promote integrated management of both stormwater quality and quantity. Channel clearing is contrary to WCC's preference for promoting native planting and ecological corridors along stream channels. Future development should be based on an assumption of native bush stream margins. Because of access difficulties above West Coast Rd it is not realistic to assume that a mown channel maintenance regime can be effected in any case.

The stream channel below West Coast Rd should be retained as an open channel after development. A planted riparian reserve of at least 60 m total width should be created along the stream margins.

## 6.6 Subcatchments E and F

Above West Coast Rd no dwellings are at risk from flooding but overland flows could be a nuisance and will need to be controlled. This could be done by either:

- (i) upgrading the piped system to convey the 20% AEP flow and forming an overland flow path, or
- (ii) constructing a pipe system capable of carrying the 1% AEP storm flow without overland flow, or
- (iii) providing peak flow detention upstream.

Detention does not appear feasible above West Coast Rd since the gully shape would dictate a long, and relatively high dam, which would be visually unattractive and expensive. Option (i) will require a 750 mm dia pipe and a formed overland flow path across 456b West Coast Rd and down a shared concrete driveway. Option (ii) avoids the surface flow path but requires a 1050 mm dia pipe and a carefully designed inlet structure to ensure that all flow is captured into the pipe system. Options (i) and (ii) have been provisionally costed at \$174,500 and \$192,500 respectively.

Below West Coast Rd up to three school buildings may be at risk of flooding caused by backing up of floodwaters upstream of a driveway culvert. Ideally the driveway should be lowered by approximately 2.0 metres to provide permanent protection to the buildings, however this will necessitate long ramps, which will intrude into access roads and carparks at either end. A simplified pond-routing analysis was carried out to determine the culvert sizes necessary to eliminate flooding. Results of this analysis were as follows:

Culvert Configuration	Storm that can be conveyed without buildings flooding
Existing 1200 dia culvert with 720 mm orifice plate	20% AEP (ie 5 year ARI)
Existing 1200 dia culvert with orifice plate removed	2% AEP (ie 50 year ARI)
Existing 1200 dia culvert replaced with new 1350 mm dia	1% AEP (ie 100 year ARI)
Existing 1200 dia culvert with orifice plate removed, plus additional 450 dia	1% AEP (ie 100 year ARI)
Improved hydraulic conditions at pipe entry (e.g. 1500 pipe with gradual transition to 1200 mm pipe)	1% AEP (ie 100 year ARI)
Existing 1200 dia culvert with orifice plate removed, with contributing catchment reduced by diverting approximately 10 Ha of park drainage to discharge below driveway	1% AEP (ie 100 year ARI)

Among the above options that of improving the culvert inlet hydraulics is probably the most simple and cost-effective. If the existing culvert is extended upstream by one 1500 dia pipe length, a new head-wall installed and a gradual 1500 – 1200 taper created, the culvert should be capable of conveying 1% AEP flood flows. The pipe extension can be largely hidden from sight by re-grading the upstream batter. The above sizes will need to be confirmed by detailed design.

Note that measures to prevent pipe blockage by debris will also be required.

#### 6.7 Seakens Way

Seakens Way is a relatively short, steep cul-de-sac off Sunvue Rd. Stormwater flows down the street channel to be picked up by two single cesspits in the cul-de-sac head. In heavy rainfall, and particularly when debris blocks the cesspit grates, water will pond and then run away over adjoining properties. Constructing additional cesspits or catchpit manholes to provide extra inlet capacity at the bottom of the cul-de-sac can eliminate this nuisance flooding relatively simply. If necessary overland flow can be diverted down the walkway to Brunner Rd by creating a small earth bund in the berm at the end of the cul-de-sac, a hotmix 'judder bar' across a private driveway, and a small nib wall down the walkway. Providing additional catchpit capacity will cost approximately \$3,000, while overland flow diversion will cost a further \$2,000.

## 7 Conclusions

Parrs Stream is generally capable of conveying present and future flood flows. The two major culvert structures at Milan Drive and West Coast Rd have sufficient capacity for the 1% AEP storm flow providing they remain unblocked, and fair capacity in the partially blocked condition<sup>a</sup>. Velocities are in the range where erosion is likely to become a problem and future channel stabilisation is likely to be necessary.

The stream channel has insufficient capacity where it passes alongside 424-426 West Coast Rd, and causes regular minor flooding. It is recommended that flood protection is provided to number 426 by constructing a flood wall around the rear and side of the property. A plan showing a possible arrangement is appended. The flood protection needs to be carried right through to link with the West Coast Rd embankment if the basement/garage is to be protected from the 1% AEP flood event.

This study has not defined a precise 1% AEP flood plain but provides guidance on the likely extent of flooding based on local knowledge, previous studies, field inspection and simple calculations.

This study did not address the issue of flood detention in the Oratia/Waikumete catchment at large, or the contribution of the Parrs Stream catchment to flooding in the larger system. The range of flows considered in this study are broadly consistent with those considered in the Oratia/Waikumete study (but note the discussion in section 3.1.3).

---

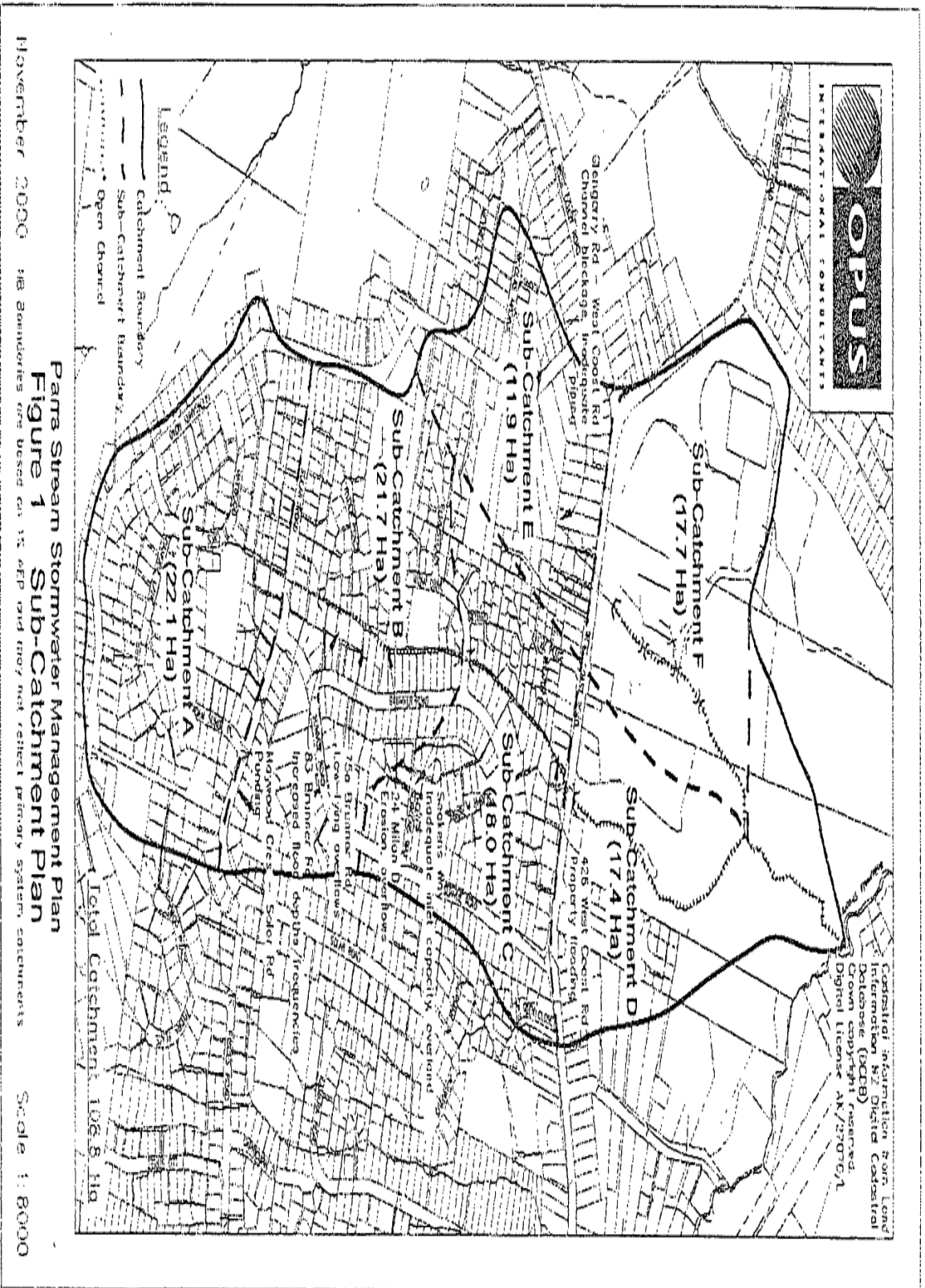
<sup>a</sup> Better than 20% AEP in the 50% blocked condition

## 8 Recommendations

1. That no new buildings shall be constructed in the 1% AEP (ie 100 year) flood plain unless they have been the subject of a specific flood investigation.
2. That new development in the catchment should, where practicable, incorporate 'low impact design' principles as per ARC technical publication TP124.
3. That new developments should incorporate stormwater management measures to restrict their post-development 50% AEP flows to their pre-development levels.
4. That all new buildings must be constructed at least 500 mm above the 1% AEP flood plain or the level of any downstream hydraulic control (eg 500 mm above the crest of any road embankment), whichever is higher.
5. In the absence of a detailed determination of 1% AEP flood levels, potential flood risk to new buildings should be minimised by ensuring they are constructed with floors as follows.  
  
Above West Coast Rd, at least:
  - 12 m removed from the centreline of the stream channel, and
  - 3.5 m above bed level  
Below West Coast Rd, at least:
  - 20 m removed from the centreline of the stream channel, and
  - 4.5 m above stream bed level.
6. That the house and property at number 426 West Coast Rd be protected from flooding by construction of a flood wall of up to 1.8 m high as illustrated in the plan appended.
7. That open channels in the catchment be monitored for channel erosion, and appropriate mitigation works implemented as and when necessary.
8. That prior to any further development in subcatchment E the capacity and condition of reticulation through the orchard upstream of West Coast Rd be investigated and upgraded as appropriate. As a minimum, additional manholes will need to be installed.
9. That piped stormwater reticulation be installed in Subcatchment E above West Coast Rd in conjunction with development of the remaining lots.
10. That the existing stormwater reticulation between 456b West Coast Rd and the existing pipe outlet below West Coast Rd be upgraded to convey the 1% AEP flow. This is expected to involve laying a new 1050 mm dia pipe together with an adequate inlet chamber.

11. That the second culvert below West Coast Rd adjacent to the wharekura be upgraded by installing a more hydraulically efficient pipe inlet structure and removing the existing orifice plate.
12. That pipe reticulation upgrading identified in the Henderson Creek South Catchment Study be implemented.
13. That the main stream channel below West Coast Rd be protected as a riparian reserve for an average width of 20 m each side. Existing ponds and wetland communities should be preserved and enhanced and additional riparian planting carried out.
14. That stormwater treatment facilities be provided throughout the catchment according to the best practicable option. This will generally involve all new developments over 1.0 Ha incorporating a stormwater treatment device capable of 75% sediment removal (as per ARC Technical Publication No 10). In subcatchments E/F this is expected to include the construction of a treatment pond upstream of 456b West Coast Rd (and possibly also a further small pond adjacent to the wharekura). Undeveloped land draining to the main stream below West Coast Rd should be provided with suitable treatment devices at the time of development, and these should be configured to treat the maximum possible length of West Coast Rd. Source control and low-impact design techniques may be appropriate for smaller sites.
15. That prior to removal of accumulated solids from stormwater treatment devices the captured material should be analysed for the presence of a range of heavy metals (including arsenic), hydrocarbons (PAH and TPH), and organochlorines. The material should then be handled and disposed of appropriately according to the findings. This requirement arises due to the urban use of the catchment and the possibility of soil contamination from former land uses.
16. That Waitakere City Council investigate, and if appropriate implement, a financial contributions policy for the funding of stormwater upgrading in the catchment.
17. That additional pipe entry capacity be provided at the end of Seakens Way together with localised bunding and nib walls to divert any overland flow down the adjacent walkway.

## Appendices



Parrs Stream Stormwater Management Plan  
Figure 1 Sub-Catchment Plan

## Parrs Stream Catchment

## TP 19 WORKSHEET

(Whenuapai + outlier) x 1.1

## CATCHMENT A (above Solar Rd)

% Impermeable 35.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	3.36	8.00	3.59	21.00	1.00	0.40	0.46	0.80	22.1
10%	4.03	9.00	4.43	20.00	1.00	0.40	0.48	0.80	Imp. Area= 7.735
1%	6.29	8.00	7.21	17.00	1.00	0.45	0.50	0.80	Perv. Area= 14.365
									Lc= 0.6
									Sc= 0.045

## CATCHMENT A+B (above Milan Drive)

% Impermeable 35.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	6.25	12.00	6.05	32.00	1.00	0.49	0.46	0.80	43.8
10%	7.59	11.00	7.57	31.00	1.00	0.40	0.48	0.80	Imp. Area= 15.33
1%	11.71	12.00	12.41	27.00	1.00	0.45	0.50	0.80	Perv. Area= 28.47
									Lc= 1.05
									Sc= 0.032

## CATCHMENT A+B+C (above West Coast Rd)

% Impermeable 35.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	8.19	15.00	7.89	42.00	1.00	0.40	0.46	0.80	61.8
10%	10.00	14.00	10.02	39.00	1.00	0.46	0.48	0.80	Imp. Area= 21.63
1%	15.51	14.00	16.54	33.00	1.00	0.45	0.50	0.80	Perv. Area= 40.17
									Lc= 1.35
									Sc= 0.025

## CATCHMENT E

% Impermeable 35.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	1.69	12.00	1.63	34.00	1.00	0.40	0.46	0.80	11.9
10%	2.03	12.00	2.04	32.00	1.00	0.46	0.48	0.80	Imp. Area= 4.165
1%	3.15	12.00	3.33	28.00	1.00	0.45	0.50	0.80	Perv. Area= 7.735
									Lc= 0.65
									Sc= 0.025

## CATCHMENT E + F

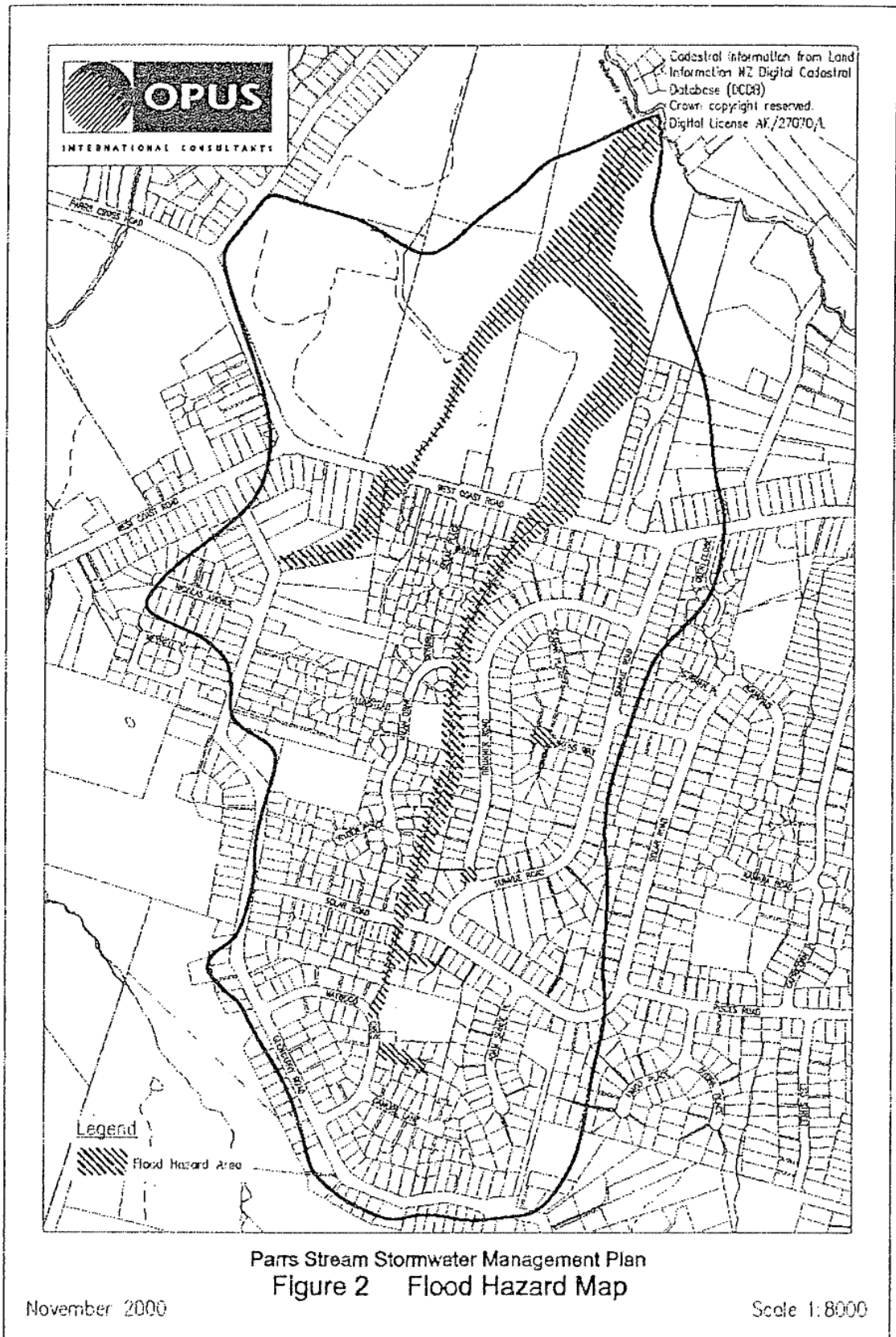
% Impermeable 15.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	2.47	16.00	3.12	43.00	1.00	0.40	0.46	0.80	29.6
10%	3.07	15.00	4.01	40.00	1.00	0.40	0.48	0.80	Imp. Area= 4.44
1%	5.02	15.00	6.70	34.00	1.00	0.45	0.50	0.80	Perv. Area= 25.16
									Lc= 1.1
									Sc= 0.025

## CATCHMENT TO WAIKUMETE STREAM (A THRU F)

% Impermeable 30.0%

Storm	Impervious		Pervious		Impervious		Pervious		Total A (ha)=
	Flow (cm/s)	Tc	Flow (cm/s)	Tc	"C"	"F"	"C"	"F"	
20%	11.12	22.00	10.99	62.00	1.00	0.40	0.46	0.80	108.8
10%	13.77	21.00	14.42	57.00	1.00	0.40	0.48	0.80	Imp. Area= 32.64
1%	22.15	21.00	25.11	48.00	1.00	0.45	0.50	0.80	Perv. Area= 76.16
									Lc= 2.2
									Sc= 0.02



## Parrs Stream Catchment Stormwater and Flooding Questionnaire

June 1999

Please read this questionnaire carefully then answer the questions and post it back to us before 21 June 1999 in the freepost envelope provided.

NO POSTAGE STAMP IS REQUIRED

Ecowater\* together with Opus International Consultants Ltd are presently studying flooding issues in the Parrs Stream catchment. We would like to hear about flooding problems affecting you, so that we can investigate them more fully, and look at ways of resolving them. You will be advised of progress and any proposals which eventuate.

Please answer the questions below as fully as possible, adding additional notes if necessary. Please include your name and address in your reply so that we can contact you for any additional information which may be necessary.

1. Please supply your name and contact details.  
(This will be used if we need to contact you for more information).

Name: .....

Address: .....

Daytime Phone No: .....

2. Have you experienced any stormwater problems on or adjacent to your property? Yes/No

If your answer to 2 was YES, please indicate (with an X) the location of the observed stormwater problems on the attached map, then proceed to 3.

If your answer to 2 was NO, your response is *still important to us*. Please proceed to question 6, complete the questionnaire and return it to us.

### Definitions used in this questionnaire

Flooding	stormwater from a drain or stream which has overflowed its banks	Groundwater	water which seeps from the ground
Ponding	accumulation of stormwater and/or groundwater into major puddles	Wastewater	used water (sewage)
		Stormwater	water which has accumulated during a period of heavy rain

Ecowater is the water and wastewater business unit of Waitakere City Council

3. What was the nature of the problem? Please tick (✓) the appropriate box.

		Up to 1 cm deep	Up to 5 cm deep	Greater than 5 cm deep
(a)	Overland flow across the property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b)	Ponding on the property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c)	Water has passed under dwelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d)	Water has entered garages/sheds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e)	Water has entered the dwelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. What frequency has the problem occurred? Please tick (✓) the appropriate box.

		More than once per year	Once per year	Once every 2-5 years	Less than once every 5 years
(a)	Overland flow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b)	Ponding on the property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c)	Water under dwelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d)	Water in garages/sheds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e)	Water in dwelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Do you have any photographs of stormwater flooding on your property that we can look at?

Yes/No

6. Do you have any further comments regarding stormwater?

.....

.....

.....

.....

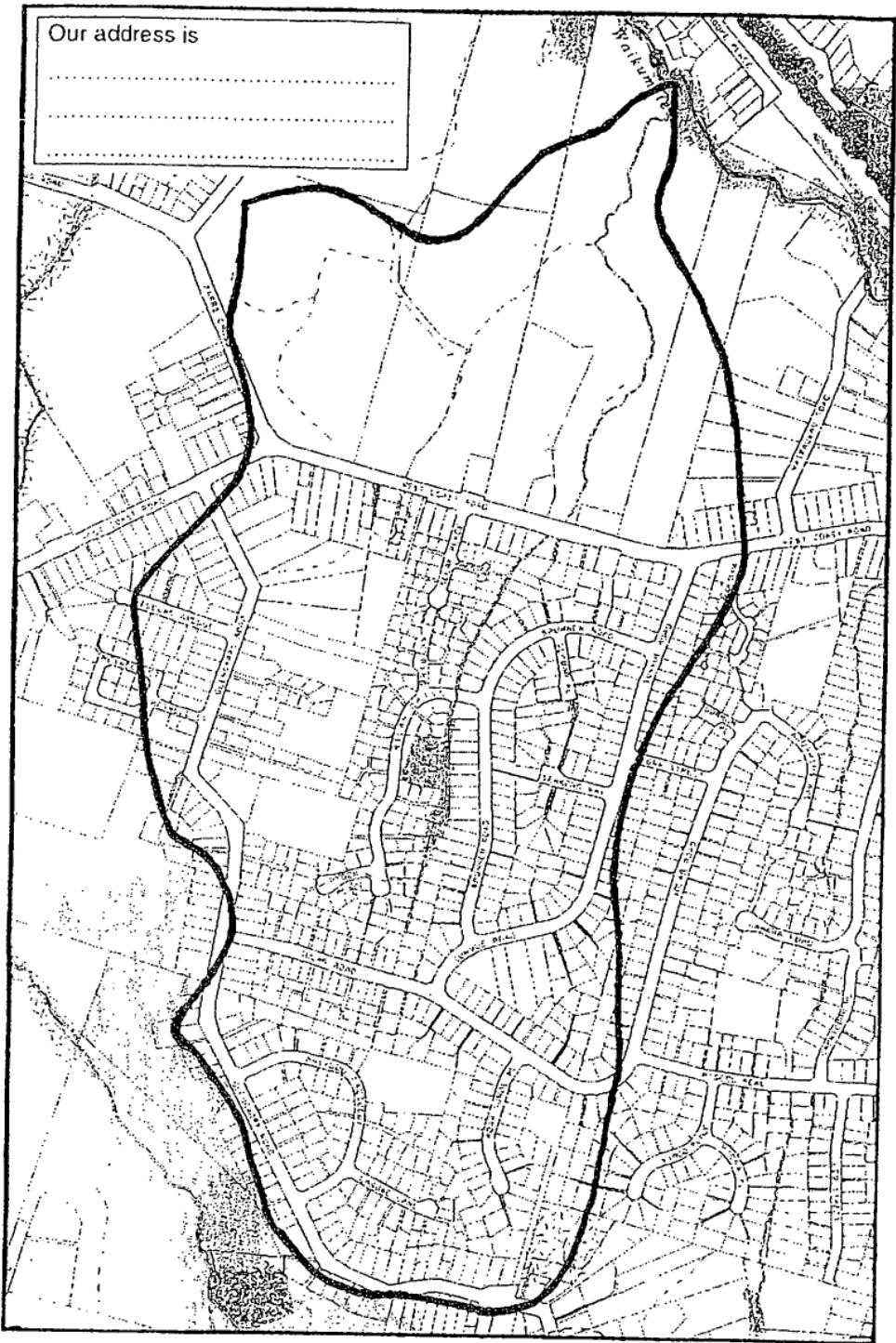
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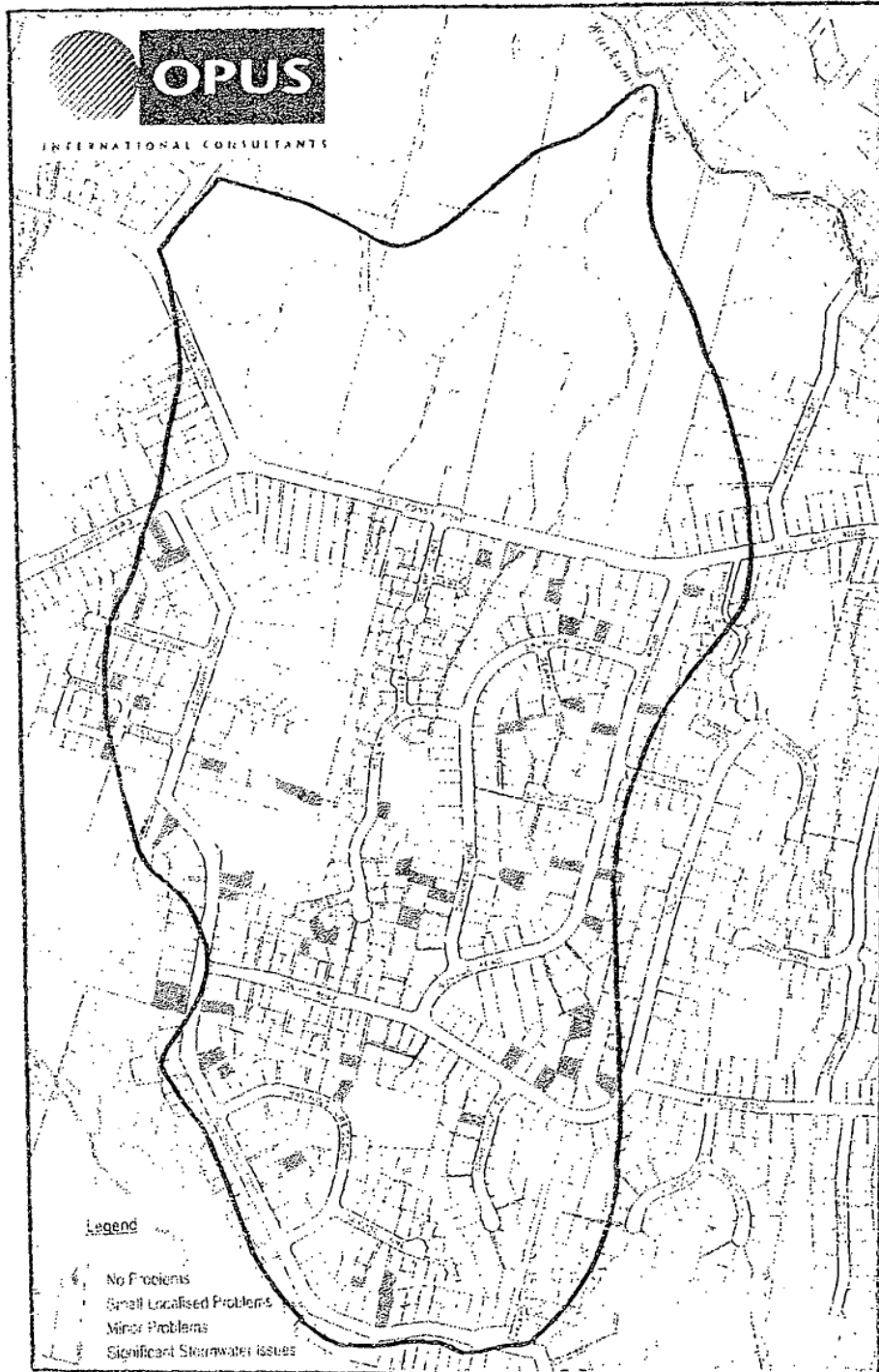
Thank you for taking the time to complete this questionnaire. The project team will use this information to identify stormwater problems and possible solutions. Please return it in the reply-paid envelope before 21 June 1999.

If you require any further information, please contact Annise Brumby at Opus International Consultants (phone 355 9578), and she will arrange for the appropriate person to contact you.



Parrs Stream Catchment

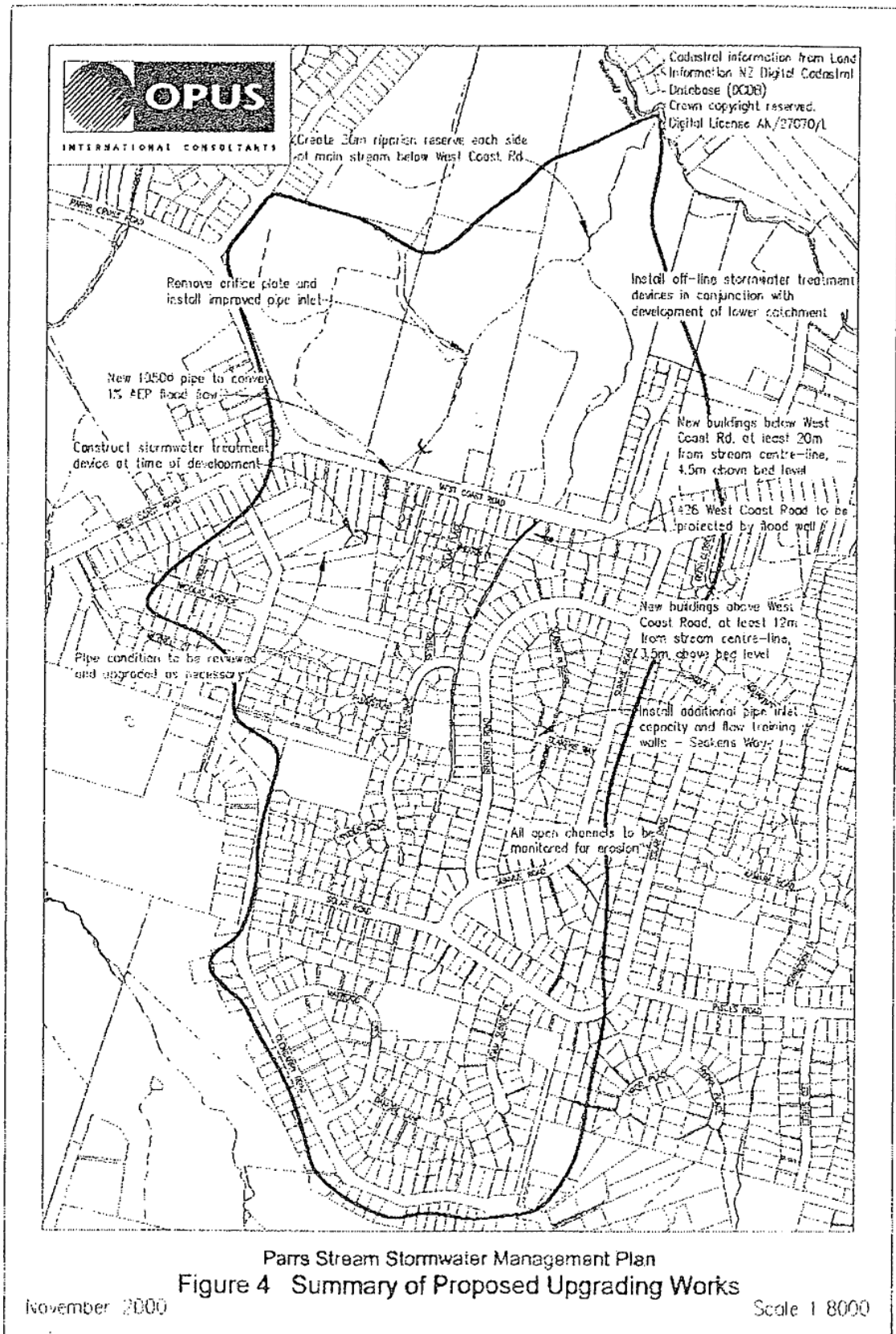


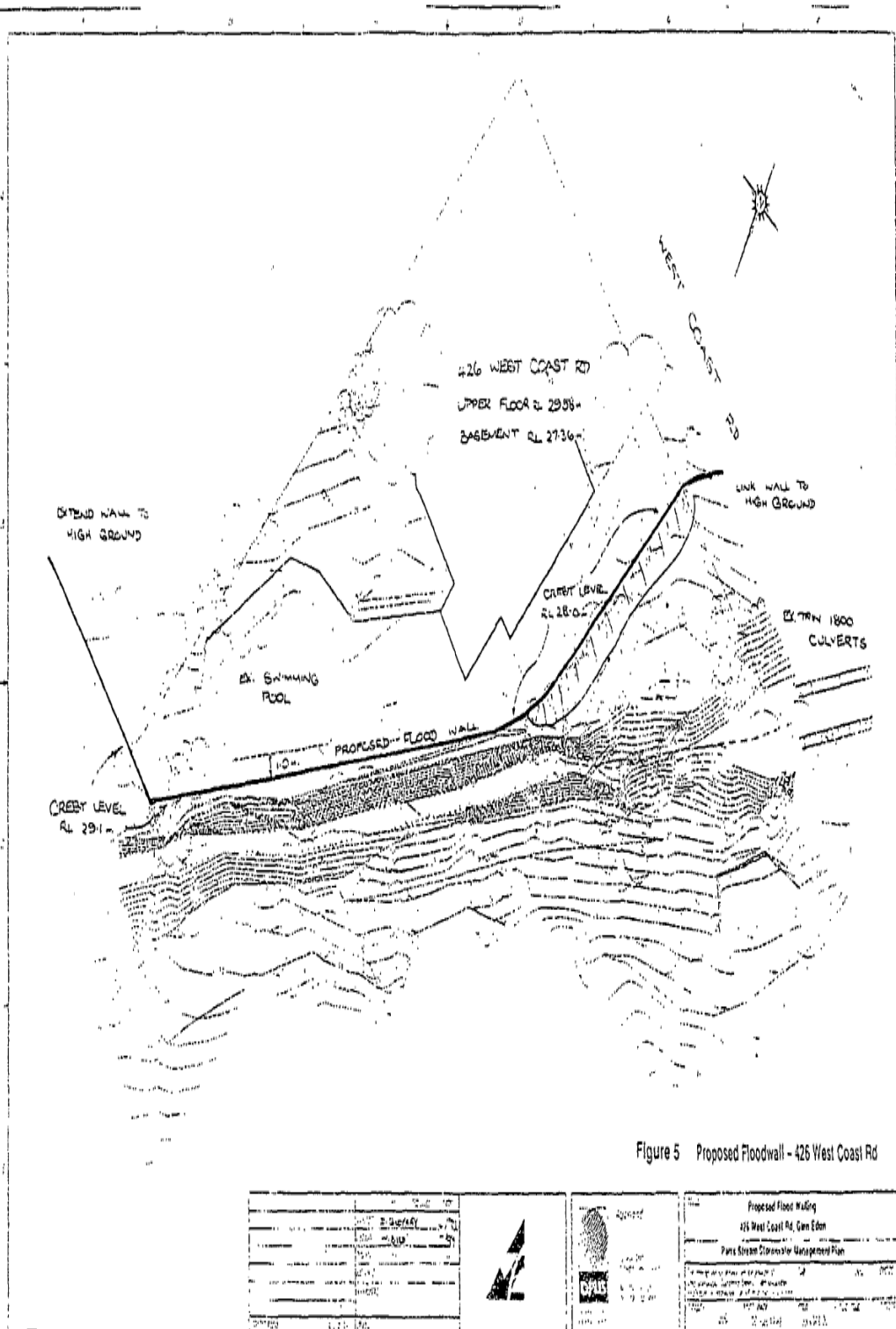


Parrs Stream Stormwater Management Plan  
Figure 3 Stormwater Issues arising from Public Consultation

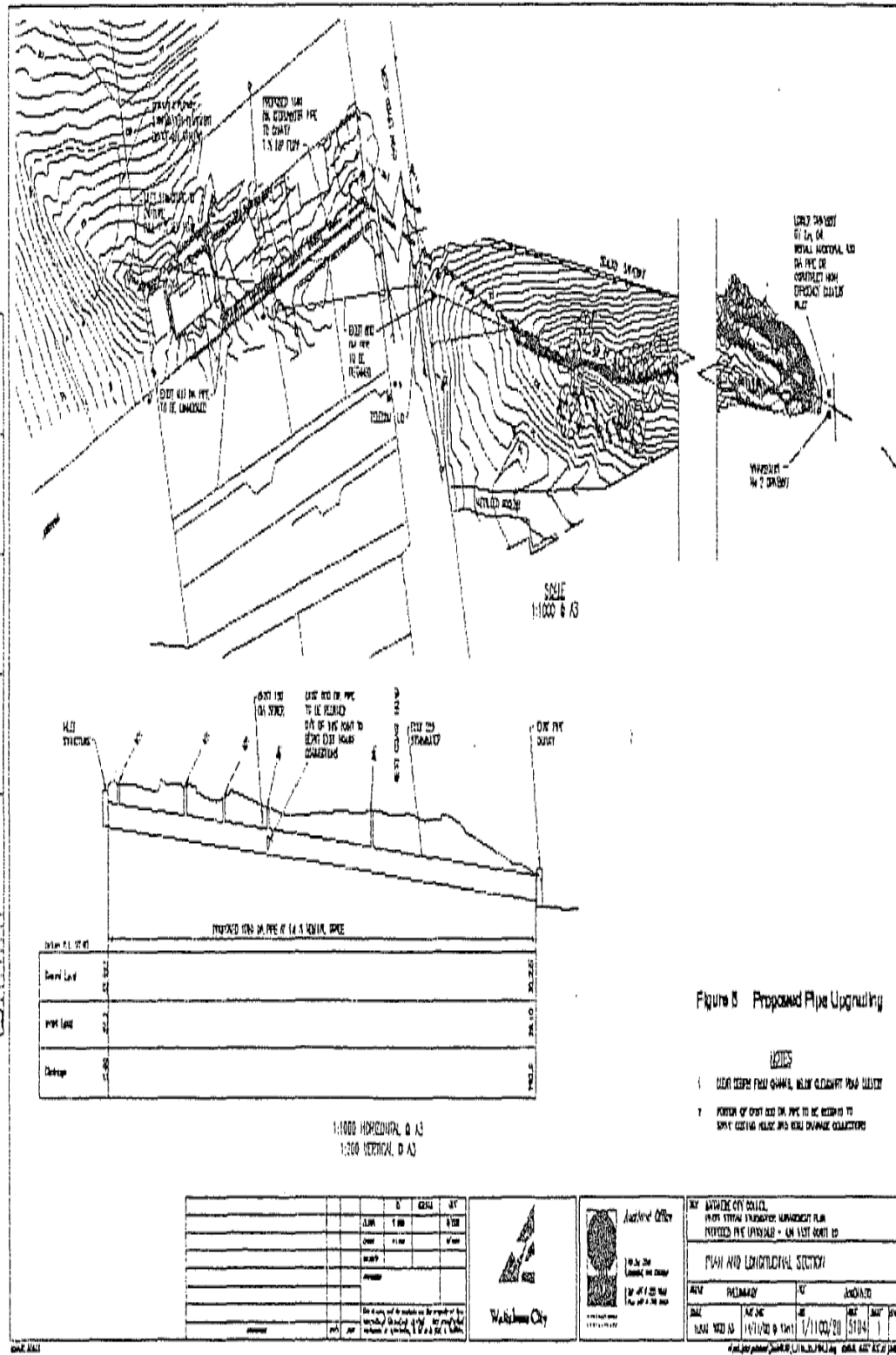
July 1999

Scale 1:8000





## 3aw045.00)



## **Appendix 10**

### **Erosion and Sediment Control**

# KEY

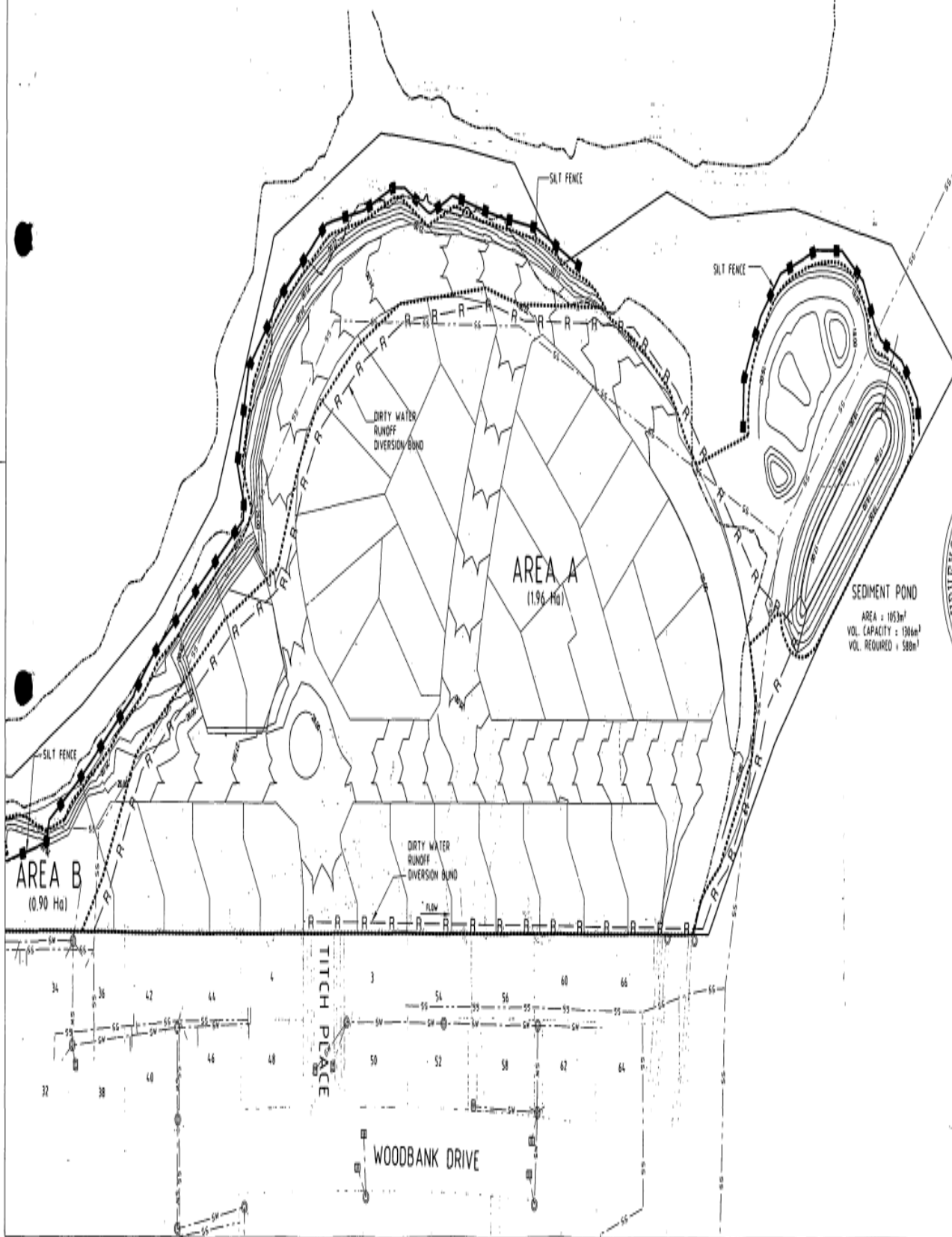
- EXISTING BOUNDARY
- - - EXISTING FENCELINE
- EXISTING CONTOUR (1.0m INTERVAL)
- EARTHWORK CONTOUR (1.0m INTERVAL)
- R — R DIRTY WATER RUNOFF DIVERSION BUND
- ■ ■ ■ ■ SILT FENCE
- CALCULATED 100% AEP FLOOD LEVEL
- ..... EARTHWORKS CATCHMENT

# NOTES

1. ALL EROSION AND SEDIMENT CONTROL FACILITIES TO BE CONSTRUCTED IN ACCORDANCE WITH ARE TP40 PUBLICATION
2. ALL EXCAVATION AREAS TO BE STABILISED WITH MULCH OR TOPSOIL PRIOR TO OPENING NEW EXCAVATION SECTION.
3. EROSION AND SEDIMENT CONTROL FACILITIES ARE TO BE CHECKED DAILY AND MONITORED DURING PERIODS OF RAIN

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DRAWING NOTES



REV	DATE	DESCRIPTION	DRAWN	CHECK



CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**EROSION & SEDIMENT  
CONTROL PLAN  
(SHEET 1)**

DESIGNED	DATE	INITIAL
	JUNE 2006	GW
DRAWN	JUNE 2006	GW
CHECKED	23/06/06	GW
APPROVED		

SCALE (A1)

1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C05	

# KEY

	EXISTING BOUNDARY
	EXISTING FENCELINE
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (10m INTERVAL)
	EARTHWORK CONTOUR (10m INTERVAL)
	DIRTY WATER RUNOFF DIVERSION BUND
	SILT FENCE
	CALCULATED 100% AEP FLOOD LEVEL
	EARTHWORKS CATCHMENT
	SUPER SILT FENCE
	CLEAN WATER RUNOFF DIVERSION BUND
	DECANT EARTH BUND

# NOTES

1. ALL EROSION AND SEDIMENT CONTROL FACILITIES TO BE CONSTRUCTED IN ACCORDANCE WITH ARC TP90 PUBLICATION
2. ALL EXCAVATION AREAS TO BE STABILISED WITH MULCH OR TOPSOIL PRIOR TO OPENING NEW EXCAVATION SECTION.
3. EROSION AND SEDIMENT CONTROL FACILITIES ARE TO BE CHECKED DAILY AND MONITORED DURING PERIODS OF RAIN

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100 FINGERSHIRE STREET  
PO BOX 7077  
AUCKLAND 1 NEW ZEALAND  
PHONE 09 278 8800 FAX 09 277 1120  
www.babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**EROSION & SEDIMENT  
CONTROL PLAN  
(SHEET 2)**

	DATE	INITIAL
DESIGNED	JUNE 2008	GW
CHECKED	JUNE 2008	GW
APPROVED	23/06/08	JP

SCALE (M)  
1:500

JOB NUMBER	DRAWING NUMBER	REVISION
42608	006	

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE OPERATIONAL PRIOR TO ANY OTHER WORKS COMMENCING ON SITE. THE CONTRACTOR SHALL ARRANGE AND ATTEND A PRELIMINARY SEEDING CONTROL MEETING WITH THE ENGINEER AND CLIENT.
2. A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE AVAILABLE ON SITE DURING WORK HOURS AND ALL PERSONNEL INVOLVED IN THE LANDSCAPE ACTIVITIES OR SITE (INCLUDING SUB-CONTRACTORS) SHALL BE FAMILIAR WITH THE CONTENT AND ANY ADJUSTMENTS AS THE RELATES TO EROSION AND SEDIMENT CONTROL.
3. ALL TO EXAMINER RUNOFF FROM THE STABILIZED SURFACES, INCLUDING CATCHMENTS AREAS ABOVE THE SITE, SHALL BE DIVERTED AWAY FROM THE EROSION AREA BY A STABILIZED SYSTEM SO AS TO PREVENT EROSION.
4. EROSION AND SEDIMENT CONTROL, SHALL COMPLY WITH "EROSION AND SEDIMENT CONTROL PLAN FOR LAND USES AND ACTIVITIES ARE TECHNICAL, SUB-COMMITTEE IN 1997, MAY 1998 AND ANY AMENDMENTS TO THIS DOCUMENT. DIVERSION OF "CLEAN WATER" FROM THE UPTHEAM CATCHMENTS ACROSS THE LANDSCAPE AREA SHALL BE BY MEANS OF DRAINAGE DRAINS AND / OR OTHER APPROVED METHODS.
5. FURTHER SEDIMENT CONTROL WORKS MAY BE REQUIRED BY THE ENGINEER AS THE PROJECT ADVANCES. THESE WILL BE INSTALLED AS REQUIRED AND APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION AND SEDIMENT CONTROL MEASURES ARE MAINTAINED AND EFFECTIVE. ALL EROSION PREVENTION OPERATIONS AT ALL TIMES



**DRAWING NOTES**

REV	DATE	DESCRIPTION	DRWN	CHECKED
DRAWING REVISIONS				



CLIENT / PROJECT  
WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR  
NZ HOUSING FOUNDATION

DRAWING TITLE

### SEDIMENT CONTROL DETAILS

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	23/06/06	IP

SCALE (A1)  
NTS

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C07	-

## **Appendix 9**

### **Traffic Assessment**

## **Residential Development**

423 – 429 West Coast Road,  
Henderson

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## **TRANSPORTATION ASSESSMENT**

---

Traffic Design Group  
PO Box 2592  
Auckland  
Phone : +64 9 302 0901  
New Zealand

[www.tdg.co.nz](http://www.tdg.co.nz)

8509ta

June 2006

  
TRAFFIC DESIGN GROUP

---

**Residential Development**  
423 – 429 West Coast Road,  
Henderson

**QUALITY ASSURANCE  
STATEMENT**

---

*Prepared by:*

**Martin Magyar**  
Senior Traffic Engineer

*Reviewed by:*

**Gary Vlieg**  
Associate

*Approved for Issue by:*

**Gary Vlieg**  
Associate

*Status:*

**Draft Report**

*Date:*

**21 June 2006**

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## **RESIDENTIAL DEVELOPMENT 423 – 429 West Coast Road, Henderson**

### **Transportation Assessment Report**

#### **1. INTRODUCTION**

Traffic Design Group has been appointed by Babbage Consultants Limited to undertake a transportation assessment for a proposed residential development at 423 - 429 West Coast Road, Henderson.

The transportation planning issues relating to the application include:

- the level of vehicular traffic likely to be generated by the development;
- the adequacy and efficiency of the access and internal circulation provisions that are intended to serve the generated vehicular and pedestrian traffic;
- the ability of the proposed parking supply to meet the actual demand expected to be generated; and
- the ability to integrate the proposed development into the existing traffic environment without significant adverse effects.

These and other matters will be addressed in the following detail of this report.

By way of summary however, it has been found that the residential development can be established with less than minor impact on the surrounding road network in terms of function, capacity and safety.

#### **2. EXISTING TRANSPORT NETWORK**

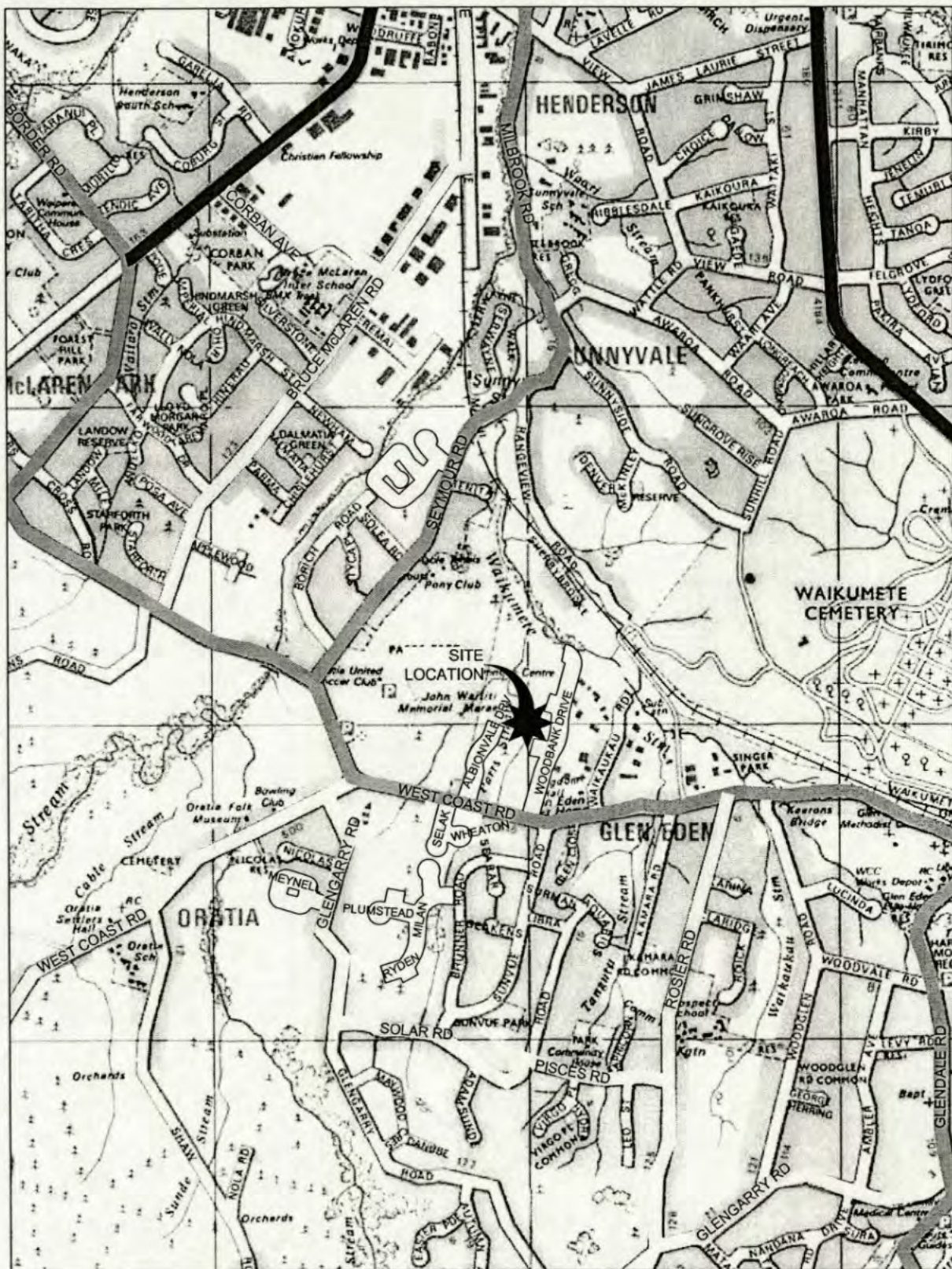
##### **2.1 Road Network**

Figure 1 shows the location of the site within the road network hierarchy as defined in the Waitakere City Council Proposed District Plan, 2002.




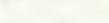

As shown in the Figure the site is located north of West Coast Road between Albionvale Road and Woodbank Drive. In the vicinity of the site West Coast Road is classified as a District Arterial Road (changing to a Collector Road west of its intersection with Parrs Cross Road). The surrounding streets, Albionvale Road, Woodbank Road, Pyramid Place, and Titch Place are all classified as Local Roads.

##### **2.2 Road Layout**

Figure 2 is an aerial photograph showing the subject site and also the layouts of surrounding roads and intersections.



BASED ON WAITAKERE DISTRICT SCHEME AND SUPERMAP BASE

-  STRATEGIC ROUTE
-  REGIONAL ARTERIAL
-  DISTRICT ARTERIAL ROAD
-  COLLECTOR ROAD
-  SCENIC ARTERIAL



# ROAD NETWORK



ISSUE	DATE	CHK.	REVISION

PROJECT:	423-429 WEST COAST ROAD RESIDENTIAL DEVELOPMENT
DRAWING:	EXISTING LAYOUT

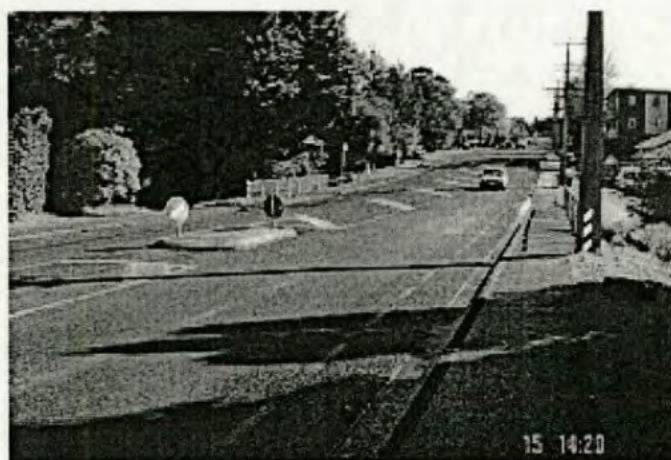


**TRAFFIC DESIGN GROUP**

2

DATE: 11/11/10	BY: [Signature]	DATE: 11/11/10	DRAWING NO: 8509A2A-SHT3
TITLE: CDM	PROJECT: 423-429 WEST COAST ROAD	ORIGINAL NO: 8509A2A-SHT3	SCALE: 1:1000
CHK: [Signature]	FILE: 8509A2A-SHT3	SCALE: 1:1000	

In the vicinity of the site, West Coast Road has a carriageway, measuring 12.6 metres in width, with a single traffic lane in both directions and a flush median which allows traffic to turn into side roads and driveways without affecting the main flow of traffic, as illustrated in Photograph 1. The carriageway is protected by a 'no stopping at all times' restriction on both sides of the road which ensures visibility is not restricted by parked vehicles. There is a raised central island with 'keep left' signs located some 13 metres east of the site frontage's eastern boundary. West Coast Road forms a three-arm roundabout intersection with Parrs Cross Road some 550 m to the west of the subject site, with two traffic lanes provided on each approach arm.



Photograph 1 : West Coast Road in the vicinity of the subject site

Woodbank Drive is a typical, cul-de-sac suburban street serving a number of residential properties. It has a carriageway width of 7.6 metres and parking is permitted on both sides. Pyramid Place and Titch Place each form short cul-de-sacs leading off Woodbank Drive serving a small number of residential properties.

Woodbank Drive forms a 'give way' priority intersection with West Coast Road, with a right turn lane provided within the flush median on West Coast Road and a pedestrian refuge provided on the Woodbank Drive approach. The Road and Traffic Standards (RTS) 6 document "Guidelines for Visibility at Driveways" provides minimum sight distance requirements for intersections. The document states a minimum sight distance requirement of 115 m for a high volume driveway onto an arterial with an operating speed of 60 km/hr. Operating speeds can be taken as the speed limit (50 km/hr) plus 15% if no speed survey data is available. Sight distances at the Woodbank Drive/West Coast Road intersection have been measured as 95m to the east and 150m to the west. These are illustrated in Photographs 2 and 3. Whilst visibility to the left is slightly below the requirements, it is considered adequate as westbound vehicle speeds on the frontage road are naturally reduced by a sharp bend in the road to the east of Woodbank Drive. The speed limit on all the roads in the vicinity of the site is 50km/h.



Photograph 2 : Sight distance looking west along West Coast Road



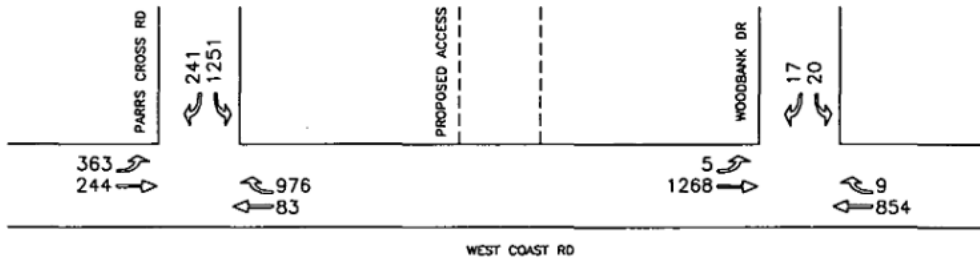
Photograph 3 : Sight distance looking east along West Coast Road

Sight distances were measured at the location of the proposed private access road off West Coast Road and were found to be in excess of 200m to the east and 167m to the west. These sight distances exceed the minimum requirements.

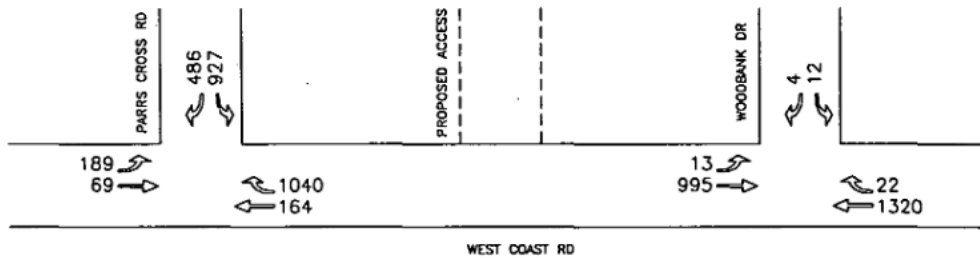
### 2.3 Traffic Flows

Traffic Design Group surveyed traffic volumes at the intersections of West Coast Road/Woodbank Drive and West Coast Road/Parrs Cross Road on Tuesday 16 May 2006. Volumes were recorded between the hours of 7.00 am to 9.00 am, 11.00am to 1.00 pm and 3.00 to 6.00 pm.

Based on the survey results it was determined that the morning peak hour occurred between 7.45 and 8.45 am and the evening peak hour occurred between 4.45 and 5.45 pm. The recorded peak hour volume for the two intersections are illustrated in Figure 3. Along West Coast Road the volume is highest eastbound in the morning peak, the reverse being true in the evening peak. The approximate two-way peak hour flows are given in Table 1 below.



# MORNING PEAK HOUR



# EVENING PEAK HOUR

	AM Peak Hour	PM Peak hour
Woodbank Drive	50	50
West Coast Road (west of Woodbank Drive)	2,150	2,300
Parrs Cross Road	2,850	2,650

**Table 1 : Observed two-way traffic volumes (vehicles per hour)**

Traffic volumes during the midday peak hour were found to be some 50% of the peak hour volumes.

No more than two vehicles at a time and generally no more than one vehicle at a time was observed queuing either to turn right into Woodbank Drive or to turn out of Woodbank Drive in either peak hour.

## **2.4 Road Safety**

A search of the Land Transport New Zealand (LTNZ) Crash Analysis System (CAS) was carried out for all crashes occurring during the five-year period to December 2005 at the West Coast Road/Parrs Cross Road and West Coast Road/Woodbank Drive intersections, as well as along West Coast Road between these two intersections.

The search revealed the following:

- A total of 5 crashes occurred within 50m of the West Coast Road/Woodbank Drive intersection, all causing minor injuries
- A total of 22 crashes occurred within 50m of the West Coast Road/Parrs Cross Road roundabout, only 7 of which caused injury (6 minor and 1 serious)
- A total of 14 crashes occurred along West Coast Road, between Parrs Cross Road and Woodbank Drive, though just one caused injury (serious)

Whilst the number of crashes that occurred initially appears higher than would be expected, on closer inspection it is revealed that the majority of the crashes did not involve injury and of those that did the majority caused only minor injuries. Based on the above crash history, and several site visits, it is concluded there are no readily evident inherent road safety deficiencies in the area surrounding the subject site.

As will be detailed later in this report, the proposed development-generated traffic can be integrated into the existing traffic environment without compromising this road safety record.

## **2.5 Pedestrian and Cycle**

In terms of pedestrian provision footpaths of adequate width are provided on both sides of all the surrounding roads. Additionally there is a pedestrian refuge on Woodbank Drive, at the intersection with West Coast Road, and dropped kerbs are provided on all arms of the Parrs Cross Road roundabout.

West Coast Road's wide carriageway and on-street parking prohibition is of benefit to cyclists.

## 2.6 Public Transport Provision

The development site lies adjacent to West Coast Road, an arterial route that is well served by public transport. Frequent services run along West Coast Road between Henderson and Downtown Auckland, including the 15F flyer service, with two services an hour throughout the day (with additional services in the peak hours). Bus stops are located on West Coast Road, directly adjacent to the development site, with the city centre-bound bus stop being provided with a bus shelter and seating.

The Auckland Regional Transport Authority (ARTA) document 'Draft Passenger Network Plan' (April 2006) states "at least 70% of all residents and employees should be within 800m of a Rapid Transit Network or Quality Transit Network". A proposed footbridge connection between the development and the residential development under construction on Albionvale Road will put Sunnyvale railway station about a one kilometre walk from the site, via Parrs Park. Further, both Sunnyvale and Glen Eden stations are within an easy cycle ride of the site.

## 3. PROPOSED DEVELOPMENT

New Zealand Housing Foundation is proposing a medium density residential development consisting of 77 dwellings with associated roading and ranging in size from 2 to 5 bedrooms to be constructed on undeveloped land. Table 2 below summarises the composition of the proposed development in terms of dwelling unit type.

Dwelling type	Number of dwellings
2 bedroom house with single carport	4
2 bedroom apartment with carport	18
3 bedroom house with single garage	13
4 bedroom house with double garage	28
4 bedroom house with single garage	6
5 bedroom house with double garage	8
<b>TOTAL</b>	<b>77</b>

Table 2 : Proposed Development

Figure 4 illustrates the proposed housing, roading layout and development staging:

- Stage 1, consisting of 35 houses, will be served by a new road network extending from Titch Place and the end of Woodbank Drive.
- Stage 2, consisting of 20 houses and 4 apartments, will be served by a new road forming an extension to Pyramid Place.
- Stage 3, consisting of 4 houses and 14 apartments, will be served by a new private access road directly off West Coast Road, between Albionvale Road and Woodbank Drive.



ISSUE / DATE	CHK	REVISION

PROJECT	423-429 WEST COAST ROAD RESIDENTIAL DEVELOPMENT
DRAWING	PROPOSED SITE LAYOUT

  
**TRAFFIC DESIGN GROUP**

4

DATE: 10/19/10	DRAWING NO: 8509A2A-SHT1
BY: [signature]	SCALE: 1/2"=1'-0"
CHK: [signature]	

## 4. TRAFFIC EFFECTS

### 4.1 Trip Generation and Distribution

The trip generating potential of the proposed subdivision has been estimated using the trip generation rates given in Section 3.0, Table 5.7 of the Waitakere City Council document 'Code of Practice for City Infrastructure & Land Development: Engineering Standards Manual'. For medium density housing the table gives the traffic generation rates per dwelling shown in Table 3 below.

	AM Peak		PM Peak	
	In	Out	In	Out
1 to 2 bedrooms	0.10	0.40	0.30	0.20
Over 2 bedrooms	0.10	0.50	0.35	0.25

Table 3 : Traffic generation rates per dwelling

The above rates were found to be comparable to the rates given within the Roads and Traffic Authority (RTA) of New South Wales (NSW) document "Guide to Traffic Generating Developments". Applying the generation rates in Table 3 to the proposed development yields the vehicle generation illustrated in Table 4 below.

	AM Peak		PM Peak	
	In	Out	In	Out
1 to 2 bedrooms	2	9	7	4
Over 2 bedrooms	6	28	19	14
<b>Total</b>	<b>8</b>	<b>37</b>	<b>26</b>	<b>18</b>

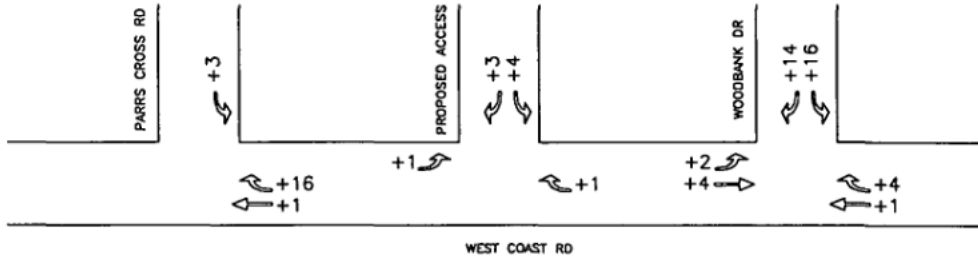
Table 4 : Predicted traffic generation

Table 4 indicates that a total of 45 trips are predicted to be generated by the proposed development in the AM peak hour and 44 trips in the PM peak hour.

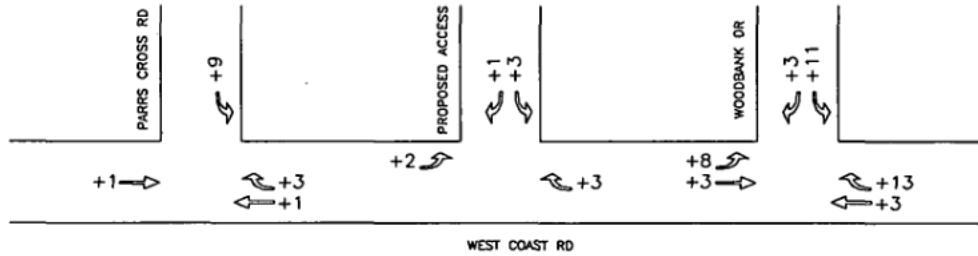
It has been assumed that the development-associated traffic will distribute onto the surrounding road network as per the existing intersection turning movements. Figure 5 thus shows the predicted site generated traffic movements at the Woodbank Drive/West Coast Road and West Coast Road/Parrs Cross Road intersections. It is noted that the traffic that will ingress and egress the new private access has been assumed to distribute as per the turning movements for the adjacent Woodbank Drive/West Coast Road and that none of this traffic will enter or exit Woodbank Drive, but instead will continue along West Coast Road.

### 4.2 Intersection Assessment

The effect of the additional 45 trips will be most evident at the intersections of West Coast Road/Woodbank Drive and West Coast Road/ Parrs Cross Road. These two intersections have therefore been assessed using the aaSIDRA analysis programme.



MORNING PEAK HOUR



EVENING PEAK HOUR

The West Coast Road/Woodbank Drive intersection was modelled as a 'give-way' priority intersection. Based on observations the West Coast Road eastbound approach was modelled as a full through lane with a 6m left turn lane, as through traffic was observed to overtake left turning vehicles. The westbound approach was modelled as a full through lane and a full right turn lane, as traffic was observed to manoeuvre fully into the flush median before turning right. The Woodbank Drive approach was modelled as one lane allowing left and right turn movements. The model was calibrated to reflect observed queue lengths.

The West Coast Road/Parrs Cross Road intersection was modelled as a roundabout with three approaches. The Parrs Cross Road approach was modelled as one through lane and one lane for through and right turn manoeuvres, as observed on site. The West Coast Road westbound approach was modelled as one through lane and one lane for through and left turn manoeuvres. The West Coast Road eastbound approach was modelled with one left turn lane and one right turn lane.

A comparison of the SIDRA results for existing traffic volumes and existing plus development traffic volumes at the two intersections is summarised in Tables 5 and 6 below. Full aaSIDRA results are provided in Appendix A.

Approach / Movement		Max Degree of Saturation		Average Delay (secs/veh)		Max. 95 <sup>th</sup> ile Queue (veh)	
		Base	Base + development	Base	Base + development	Base	Base + development
<b>AM peak</b>							
West Coast Rd	Through	0.23	0.23	0	0	0	0
Westbound	Right Turn	0.08	0.13	37	38	0	0
Woodbank Road	Left Turn	0.34	0.63	43	59	1	3
	Right turn	0.34	0.64	43	59	1	3
West Coast Rd	Left Turn	0.01	0.02	6	7	0	0
Eastbound	Through	0.70	0.70	0	0	0	0
All movements		0.70	0.70	1	3	-	-
<b>PM peak</b>							
West Coast Rd	Through	0.36	0.36	0	0	0	0
Westbound	Right Turn	0.08	0.13	18	18	0	1
Woodbank Road	Left Turn	0.09	0.16	23	24	0	1
	Right turn	0.09	0.16	23	24	0	1
West Coast Rd	Left Turn	0.03	0.05	7	7	0	0
Eastbound	Through	0.54	0.54	0	0	0	0
All movements		0.54	0.54	1	1	-	-

Table 5 : Woodbank Drive/West Coast Road - aaSIDRA Results

Approach / Movement		Max Degree of Saturation		Average Delay (secs/veh)		Max. 95 <sup>th</sup> ile Queue (veh)	
		Base	Base + developm ent	Base	Base + developm ent	Base	Base + developm ent
<b>AM peak</b>							
Parrs Cross Road	Through	0.74	0.75	11	11	13	13
	Right Turn	0.74	0.75	16	16	13	13
West Coast Rd Eastbound	Left Turn	0.60	0.61	15	15	6	6
	Right Turn	0.51	0.51	19	19	4	4
West Coast Rd Westbound	Left Turn	0.53	0.53	10	10	6	6
	Through	0.53	0.53	9	9	6	6
All movements		0.74	0.75	12	12	-	-
<b>PM Peak</b>							
Parrs Cross Road	Through	0.54	0.55	7	7	7	7
	Right Turn	0.54	0.55	12	12	7	7
West Coast Rd Eastbound	Left Turn	0.36	0.36	12	12	3	3
	Right Turn	0.20	0.21	18	18	1	1
West Coast Rd Westbound	Left Turn	0.73	0.73	16	16	11	11
	Through	0.73	0.73	15	15	11	11
All movements		0.73	0.73	12	12	-	-

Table 6 : West Coast Road/Parrs Cross Road - aaSIDRA Results

As shown in the tables above, the effect of the proposed development-associated additional traffic on the capacity of the Woodbank Drive/West Coast Road and West Coast Road/Parrs Wood Road intersections will be minor.

At the Woodbank Drive/West Coast Road intersection the longest average delay per vehicle will increase from 43 to 59 seconds on the Woodbank Drive approach with the addition of development-associated traffic. At the West Coast Road/Parrs Cross Road intersection the average delay per vehicle will remain the same on all approaches with the addition of development-associated traffic.

The proposed private access road has not been modelled but given the low number of small apartments and houses that will be accessed from it no operational difficulties are envisaged.

## 5. PARKING

### 5.1 Parking Requirements

Waitakere City Council's 'Parking and Driveway Guideline' provides car parking ratios for specific activities. The requirements for medium density residential developments are summarised in Table 7 below.

Number of bedrooms	Parking spaces required
1 to 2	1 per 1 unit plus 1 per 4 units for visitors
3 or more	3 per 2 units plus 1 per 3 units for visitors

Table 7 : City Council Parking Requirements for Medium Density Housing

#### 5.1.1 Resident parking

The proposed development will consist of 22 units with 1 or 2 bedrooms and 55 units with 3 or more bedrooms. Applying the ratios shown in Table 7 to the proposed development gives a minimum dedicated resident parking requirement of 105 spaces.

#### 5.1.2 Visitor parking

The new development is not self contained, with the three stages, or areas, of the development to be served by roads that are not interlinked but instead link to the existing road network. It is reasonable to assume that visitors will wish to park in the area they are visiting and visitor parking should be provided accordingly. The visitor parking requirements for each development stage is thus shown in Table 8 below.

Development Stage	Development content	Visitor parking requirement (by stage)
Stage 1	35 x 3 or more bedroom units	12
Stage 2	4 x 2 bedroom units and 20 x 3 or more bedroom units	8
Stage 3	18 x 1 or 2 bedroom units	5
Total		25

Table 8 : Visitor parking requirements

### 5.2 Parking Provision

A total of 220 dedicated resident parking spaces are to be provided within the development consisting of carports, garages, and driveways in front of garages. A single garage and its associated driveway has been counted as two parking spaces. This is considered appropriate as the spaces are dedicated and will therefore both be used by the same resident.

The apartments will be provided with parking spaces at a ratio of between 1.3 and 2 per dwelling. The two and three bedroom houses will be provided with 2 parking spaces (a single garage or carport and driveway). The majority of the three, four and five bedroom houses will be provided with 4 parking

spaces (a double garage and double driveway), with the exception of four of the four bedroom houses which will have 2 parking spaces (a single garage and driveway).

The proposed visitor parking provision for each stage of the development is shown in Table 9.

Development stage	Proposed visitor parking provision (by stage)
Stage 1	21
Stage 2	13
Stage 3	6
<b>Total</b>	<b>40</b>

**Table 9 : Visitor parking provision**

The visitor parking is to be provided as in-dented, on-street parking bays situated at various locations and grouped to ensure that they remain a pooled resource, available to visitors in general on a first-come, first-served basis.

### **5.3 Parking Summary**

It can be seen that dedicated resident and visitor parking will be provided in excess of minimum requirements outlined in the District Plan. This will help ensure that over-spill parking onto the streets need not occur.

## **6. ROAD LAYOUT**

An internal network of roads will be constructed to serve the proposed development:

- Access driveway off West Coast Road
- Road extension of Pyramid Place
- Road extension of Titch Place and Woodbank Drive forming a circular route with additional connecting roads

The access driveway off West Coast Road will remain private, whilst the remainder of the proposed network will be vested with Waitakere City Council.

The Waitakere City Council discussion paper 'Developer's Design Guide for Residential Subdivision and Medium Density Housing' provides guidance on the design requirements for new roads within residential developments. The proposed road network has been designed as Type 4 Local Streets which consist of a 5.5m wide carriageway, 2.5m indented parking (where provided), 1.5m footpaths and grassed berms, all within a maximum road reserve of 15m.

It is noted that the intersections within the internal road layout will require further consideration at the detailed design stage to meet all current geometric and safety guidelines.

## 7. SERVICING

There will be no loading spaces provided as part of the proposed development. The development is comprised of residential lots that will need only infrequent servicing.

For Stages 1 and 2 of the development there is to be no central rubbish collection area or central postal area, with these services being provided to each dwelling individually as is currently the case in the area. For the Stage 3 development, rubbish collection will either be from a central rubbish collection area located at the West Coast Road end of the new private access road or from individual dwellings. The latter option will require a turning head capable of accommodating rubbish trucks. This is to be determined and finalised at detailed design stage.

Waitakere City Council's 'Parking and Driveway Guideline' lists various design vehicles used to aid design of road and parking layouts. It suggests a Medium Rigid Truck (MRT) design vehicle be used to assess ability to provide domestic refuse collection.

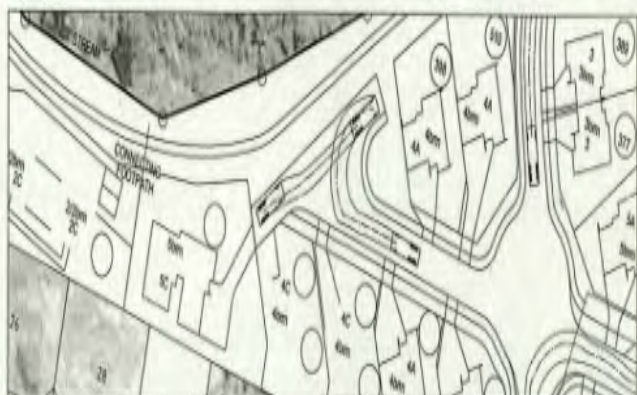
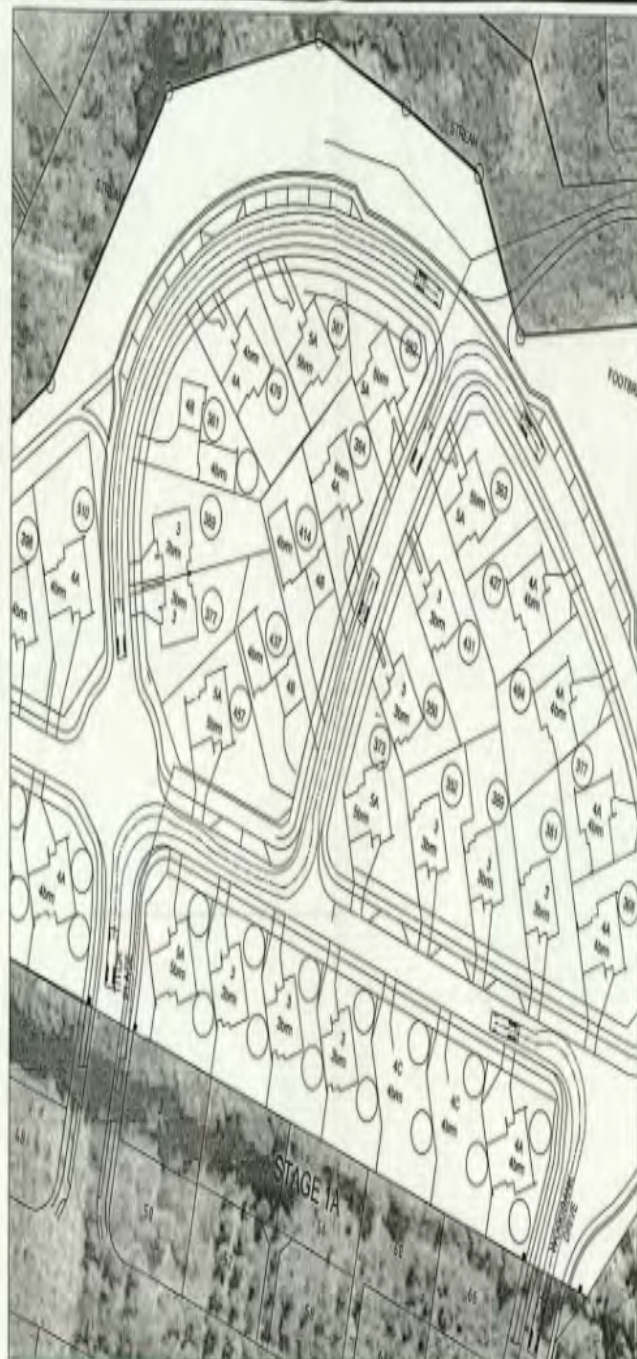
The tracking path of an MRT has therefore been used to illustrate the accessibility of the proposed road layout for a rubbish truck. The tracking path of an MRT at critical points within the development is illustrated in Figure 6. As shown, the site will be adequately accessible by rubbish trucks assuming adequate parking restrictions are implemented on the proposed roads. It is understood that Type 4 Local Streets will include broken yellow line parking restrictions due to their relatively narrow carriageway width.

## 8. CONSTRUCTION TRAFFIC

Whilst the exact amount of construction-related traffic that will be required to construct the development is unknown at this stage, it is considered that the volume will be minimal and not cause any operational or safety problems on the adjacent roads.

At the Woodbank Drive/West Coast Road intersection the majority of construction traffic will route to or from the east (either motorway or city-bound) and thus will not have to turn right out of Woodbank Drive. Further, construction traffic manoeuvres will be distributed throughout the day and will mainly occur outside of peak hours when background traffic flows are considerably lower.

During the initial period prior to construction when earthworks will be required to prepare the site it is understood that construction traffic movements will be minimal, with the equipment brought in at the beginning to remain on-site until works are complete. The exception will be a period of approximately 30 days when it will be necessary to move equipment between the two sides of the stream that runs through the site. It will also be necessary to remove around 15,000 m<sup>3</sup> of earth from the site. This equates to some 1,500 truck loads, distributed over a four month period. It is not considered that this will cause any problems given that West Coast Road is classified as an Arterial Road.



ISSUE	DATE	CHK	REVISION

PROJECT:

423-429 WEST COAST ROAD  
RESIDENTIAL DEVELOPMENT

DRAWING:

TRUCK MANOEUVRES

TRAFFIC DESIGN GROUP

6

DESIGNER	DATE	DATE	DRAWING NO.
TCL: CTR	10/08/08	10/08/08	8509A2A-SHT3
CHK: CTR	10/08/08	10/08/08	10/08/08

## 9. DISTRICT PLAN REQUIREMENTS

The District Plan's Medium Density Housing Criteria section is of relevance in terms of transportation-related design. The relevant criteria are given in Table 10 below together with comments on how the assessment criteria have been met.

Design Element	Assessment Criteria	Comment
Design Element B – Site Layout	B1 – Ensure the development is well connected into the neighbourhood with adequate vehicle and pedestrian links	Complies. The proposed road and associated footpath network will be linked to the existing road network, offering good connectivity
Design Element E- Car Parking and Vehicle Access	<p>E1 – Sufficient car parking should be provided to meet projected needs of residents, including visitors. In general the minimum requirement is one parking space per residential unit. Visitor parking may also be necessary in large developments, or when the potential for off-site visitor parking is limited.</p> <p>E2 – Car parking facilities should:</p> <ul style="list-style-type: none"> <li>• be close and convenient to houses</li> <li>• be secure, or allow visual contact from houses</li> <li>• be well ventilated if enclosed</li> <li>• be well-lit and have well-lit pedestrian links to houses</li> <li>• clearly identify any visitor parking</li> <li>• be separate from bedroom windows to minimise noise and fumes</li> </ul> <p>E3 – Car parking areas and garages may be grouped to make efficient use of land, including the use of parking bays on roads and driveways internal to the medium density housing area.</p> <p>E4 – Car parking and driveways should:</p> <ul style="list-style-type: none"> <li>• allow safe and efficient vehicle movements</li> <li>• minimise access points, where abutting arterial routes, and ensure vehicle egress in forwards direction</li> <li>• not dominate the view of the development from the road</li> <li>• be surfaced and graded to ensure efficient stormwater disposal</li> <li>• be planted with shade trees and screening vegetation where practicable</li> </ul>	Complies with criteria E1 to E4. Section 5 of this report has discussed the parking requirements for the development and demonstrated that the requirements will be fulfilled.

Table 10 : District Plan – Medium Density Housing Criteria

There are further transportation-related guidelines contained within the City Council document 'Code of Practice for City Infrastructure and Land Development – Parking and Driveway Guideline'. The relevant sections are summarised in Table 11 below.

Criterion	Comment
<b>2. Parking and Loading Space</b> <b>2.2 Number of Spaces</b> <i>... the number of car parking spaces should be in accordance with the ratios given in Tables 2.1 and 2.2, and the number of loading spaces should be in accordance with Table 2.3.</i>	The proposed development falls under the Residential – Medium Density Housing category. Section 5 of this report has discussed the requirements and demonstrated that the requirements will be fulfilled.
<b>5. Traffic Generation</b>	The traffic generation rates given in Table 5.7 of the Code of Practice were applied to the proposed development. Traffic generation estimates indicated that the development will generate 45 trips in each peak period.
<b>6. Access Capacity and Queuing</b>	The results of the road intersection analysis performed are given in Section 4 of this report. It was shown that the effect of the addition of development-associated traffic will be less than minor at the intersections of Woodbank Drive / West Coast Road and West Coast Road / Parrs cross Road.
<b>7. Access, driveway, and circulation road geometry</b>	The geometry of the internal road layout of the development has been designed through consultation with City Council officers and is considered to fulfil requirements.
<b>8. Neighbourhood Traffic Effects</b>	It is considered that the effects of the proposed development on the surrounding road network will be no more than minor. Refer to Section 4 of this report.

Table 11 : Waitakere City Council - Parking and Driveway Guideline

## 10. CONCLUSION

On the basis of this transportation assessment, it is concluded that the proposed residential development can be established with no more than minor effects to the function, capacity or safety of the surrounding traffic environment.

Specifically, the operation of the West Coast Road/Woodbank Drive and West Coast Road/Parrs Wood Road intersections will not be adversely affected as a result of this proposal with the development having only a minor effect.

Furthermore, there is nothing about the proposed new roads and intended development that should adversely affect the existing road safety record.

Accordingly, it is found there is no traffic planning reason to preclude the acceptance of the development proposal as presented.

Traffic Design Group Ltd  
21 June 2006



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## APPENDIX A

### aaSIDRA Analysis Results

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## **Appendix 8**

### **Services Plan**

# KEY

	EXISTING BOUNDARY
	EXISTING CESSPIT/DOUBLE CESSPIT
	EXISTING STORMWATER PIPE
	EXISTING WASTEWATER PIPE
	PROPOSED STORMWATER PIPE
	PROPOSED WASTEWATER PIPE
	PROPOSED CESSPIT/DOUBLE CESSPIT
	CALCULATED 100 YEAR FLOOD LEVEL
	DRAINAGE EASEMENT

# NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAITAKERE CITY COUNCIL'S CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. ALL MANHOLES ARE 1500 UNLESS NOTED OTHERWISE.
3. ALL CESSPIT LEADS ARE 225 UNLESS NOTED OTHERWISE.
4. ALL PIPELINES UNDER ROADS OR ACCESSWAYS SHALL BE BACKFILLED WITH APPROVED COMPACTED HARDFILL TO DESIGN SUBGRADE LEVEL.
5. ALL EXISTING MANHOLES SHALL BE ADJUSTED TO SUIT FINISHED GROUND LEVELS.
6. THE CONTRACTOR IS TO CONFIRM ALL EXISTING SERVICES PRIOR TO WORKS COMMENCING.

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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECKED



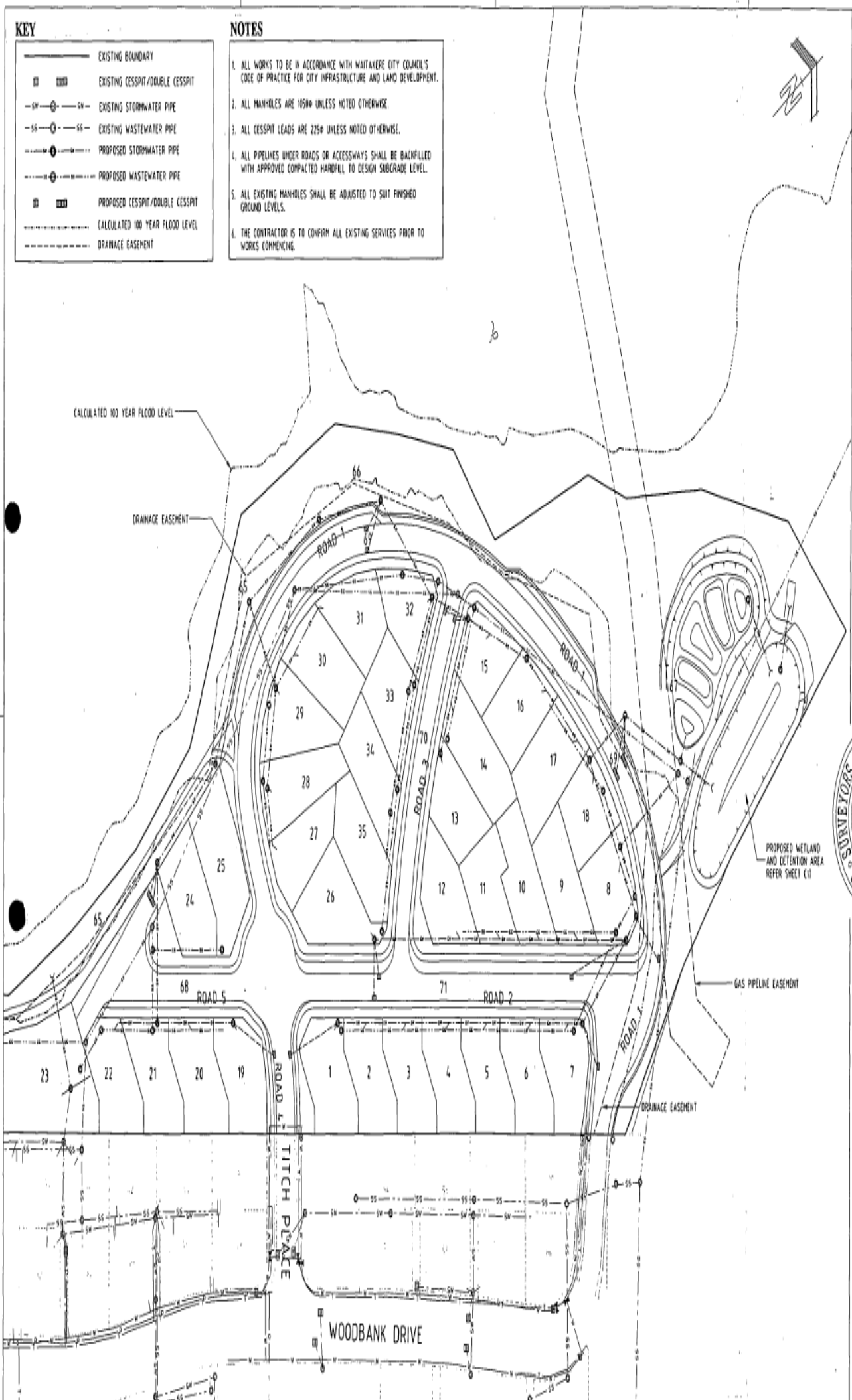
CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**DRAINAGE PLAN  
(SHEET 1)**

DESIGNED	DATE	INITIAL
	JUNE 2008	FK
DRAWN	JUNE 2008	FK
CHECKED		
APPROVED	23/06/08	

SCALE (A1)  
**1:500**

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C10	



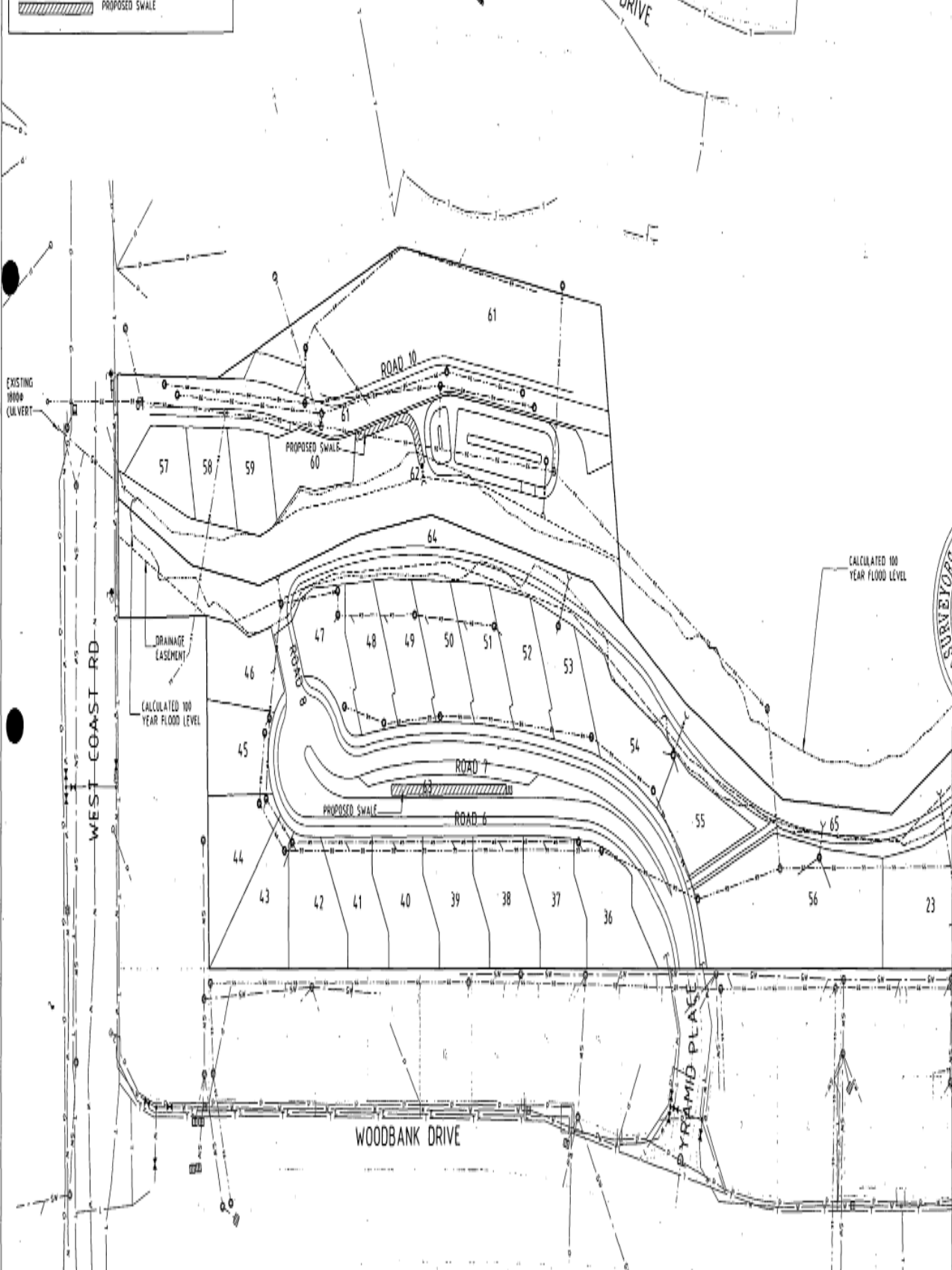
# KEY

- EXISTING BOUNDARY
- EXISTING CESSPIT/DOUBLE CESSPIT
- EXISTING STORMWATER PIPE
- EXISTING WASTEWATER PIPE
- PROPOSED STORMWATER PIPE
- PROPOSED WASTEWATER PIPE
- PROPOSED CESSPIT/DOUBLE CESSPIT
- CALCULATED 100 YEAR FLOOD LEVEL
- DRAINAGE EASEMENT
- PROPOSED SWALE

# NOTES

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REV	DATE	DESCRIPTION	DRAWN	CHECK



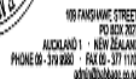
CLIENT / PROJECT  
**WEST COAST ROAD HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

## DRAINAGE PLAN (SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 2008	FK
DRAWN	JUNE 2008	FK
CHECKED	23/06/06	FK
APPROVED	23/06/06	FK

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C11	



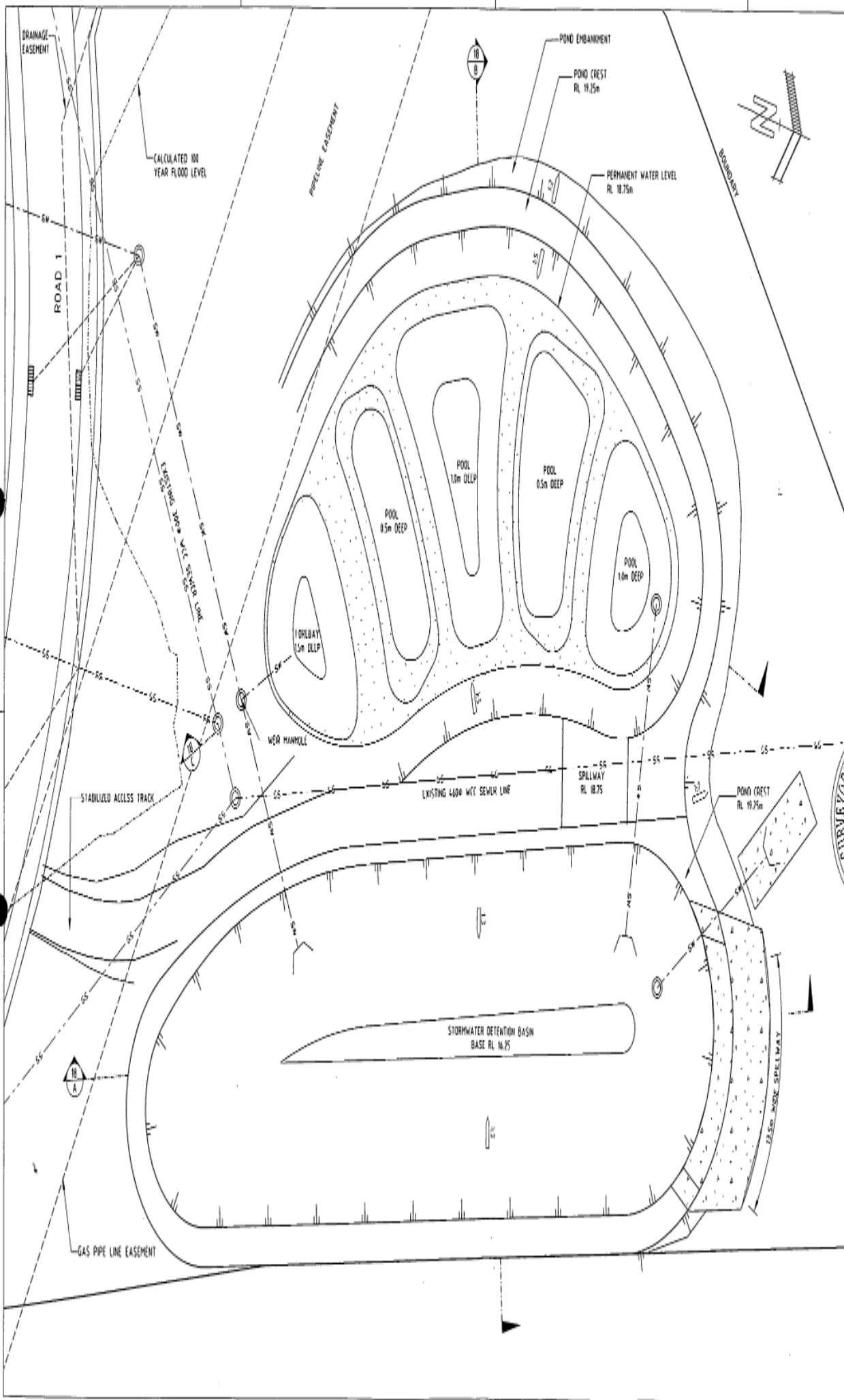
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	DATE	INITIAL
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DRAWN	JUNE 2006	MJD
CHECKED		
APPROVED	23-06-06	IP

SCALE (A1)

1:125

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C16	-



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 108 FINGERS STREET  
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 admin@babbage.co.nz

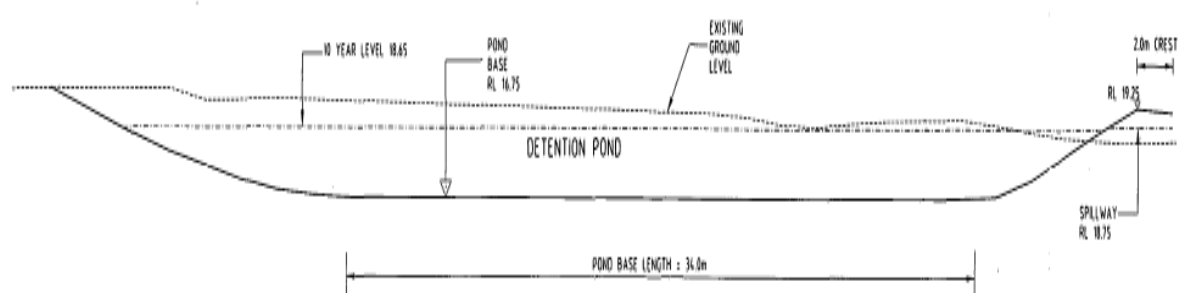
CLIENT / PROJECT  
**WEST COAST ROAD  
 HOUSING DEVELOPMENT**  
 FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
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 POND LAYOUT**

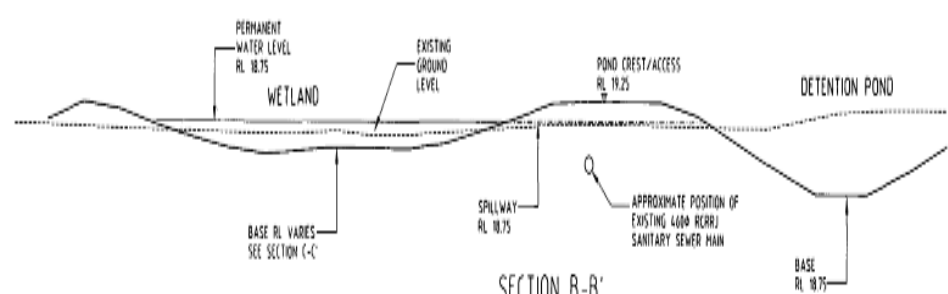
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	JUNE 2008	OWR
DRAWN	JUNE 2008	OW
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APPROVED	25.06.08	IP

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 JOB NUMBER  
**42608**  
 DRAWING NUMBER  
**C17**  
 REVISION

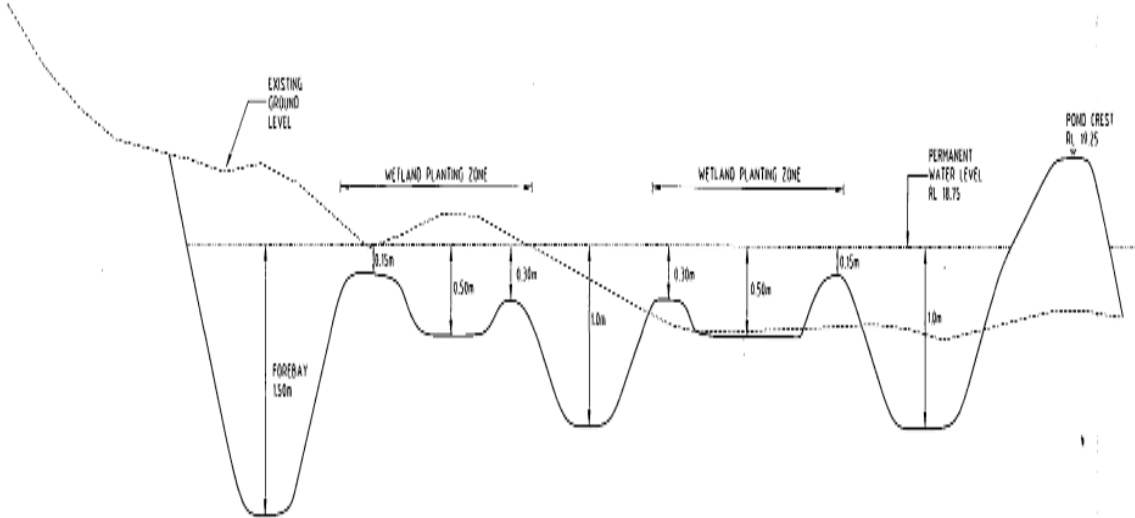
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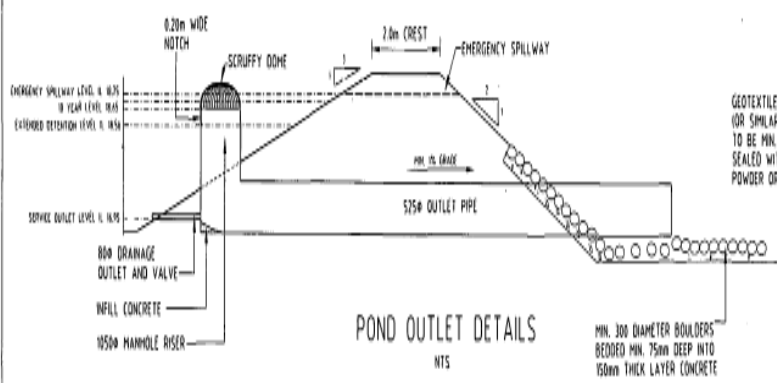
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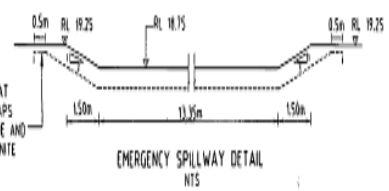
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SECTION C-C' - BANDED BATHYMETRY  
 SCALE HORIZ 1:100 VERT 1:20



POND OUTLET DETAILS  
 NTS



EMERGENCY SPILLWAY DETAIL  
 NTS



CLIENT / PROJECT  
**WEST COAST ROAD  
 HOUSING DEVELOPMENT**  
 FOR  
**NZ HOUSING FOUNDATION**

**POND  
 DETAILS PLAN**

	DATE	INITIAL
DESIGNED	JUNE 2006	DMR
DRAWN	JUNE 2006	GM
CHECKED		
APPROVED	23/06/06	JP

SCALE (A1)  
 AS SHOWN

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C18	

## **Appendix 7**

### **Landscape Plan / Visual Assessment / Arborist Report**

**NZ HOUSING FOUNDATION  
BABBAGE CONSULTANTS**

**423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT**

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2. ARBORIST'S REPORT
3. WEED MANAGEMENT PLAN
4. LANDSCAPE MASTERPLAN SHEET ONE, DRAWING: LSP 001
5. LANDSCAPE MASTERPLAN SHEET TWO, DRAWING: LSP 002
6. TYPICAL GARDEN LAYOUT FOR HOUSE TYPE 4A, DRAWING: LSP 003
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**NZ HOUSING FOUNDATION  
BABBAGE CONSULTANTS**

423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT

**ASSESMENT OF VISUAL EFFECTS**

**NZ HOUSING FOUNDATION  
BABBAGE CONSULTANTS**

423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT

**ASSESSMENT OF VISUAL EFFECTS**

**Introduction**

This section reports on the visual effects of the proposal for residential development of land at 423-429 West Coast Road, Henderson. It also refers to the measures for the avoidance or mitigation of the adverse effects that have been incorporated in the proposals.

The assessment is based on the development proposals and the mitigation measures as shown on the following SOUL environments drawings:

LSP 01 – LANDSCAPE MASTERPLAN SHEET ONE  
LSP 02 – LANDSCAPE MASTERPLAN SHEET TWO

**Method of assessment**

The approach used to assess likely visual and landscape effects was as follows:

1. Site visit and familiarisation
2. Survey of visual and landscape character of the site and its environment
3. Identification of the general visual envelope of the site and the key views.
4. Survey of the present condition of the site and its environs. Identification and assessment of vegetation, topography and other landscape features within the site and close to its boundaries.
5. Estimation of likely visual and other effects on landscape amenity of the proposed sub-division and development.
6. Consideration of proposals for avoiding or mitigating adverse effects that form part of the landscape proposals for the redevelopment.

## Existing landscape character

### Local Landscape character site environs

The application site is located to the west of Glen Eden between the West Coast Road and the Waikumete Stream. The general character of this suburb is of established suburban-residential with associated reserves and schools. The older houses in the area consist mostly of single storey, dwellings on average size sections with attractive gardens including trees and shrubs. More recent, infill development in the locality is denser. Examples of this are found adjoining the site to the west and the east. Recent housing west of the site includes two and three storey terraced (row house) dwellings, some of which are situated on high ground overlooking the application site (see figure 1).



Fig 1: Adjacent housing on ridge showing three storey row houses

Residential development currently under construction to the north west of the site consists of mainly single storey traditional brick faced bungalow houses.

A similar style of housing and streetscape is found in the recently developed area east of the site. (See figure 2).



Fig 2: Adjacent housing east of the site at the northern end

North of the site is a reserve that forms the setting of the Waikumete Stream and this contains regenerating native forest dominated by kanuka with young plants of other forest species establishing in their vicinity. (See figure 3).



Fig 3: Kanuka forest (following the Waikumete stream) is visible across gorse scrub north of the site

There are a fair number of small to medium sized trees established in the local residential areas, some larger trees are found in the older private sections and give a sense of maturity to these more established areas. The overall visual character of the vicinity is of a moderately leafy suburb.

The housing density proposed for the site is typical of recent subdivisions that consist of traditional detached house types, but on compact sections. The smaller sections often leave little room for larger trees and so the most important trees in the area are generally found on the road frontages.

### **Visual character of the site**

The site itself forms the lower parts of the valley of a tributary of the Waikumete Stream. It consists mostly of gentle to moderate slopes covered with overgrown grassland and weed species of scrub, trees and grassland. In its present condition the site has only minor amenity value mainly as open space affording longer views than normally found within suburban residential streets.

Although part of the site is visible from West Coast Road, this view is restricted and it is easy to miss if driving past in a vehicle.

The present character of the site is run down due to lack of productive activity and management in recent times.

### **Topography**

The site falls to the North along the stream. The undulating slopes down to the stream create topographic variety and, although its banks are currently overrun by weed growth, this stream is the major landscape feature of the site, helping to create a distinctive sense of place.

### **Existing vegetation**

Please refer to the Arborist's Report for a full description of the exiting vegetation on the site.

### **Views to the site**

The site is intermittently visible from the surrounding streets and the properties adjoining these streets but only for a limited distance. Because of the topography and the distribution of buildings and trees in the surrounding area, the visual envelope of the site extends little more than a few hundred metres from the site.

The key views of the site are from West Coast Road (See figure 4)



Fig 4: View from the footpath on West Coast Road looking north into the site

Other key views into the site are from the surrounding housing areas but these are generally limited in extent See figure 5



Fig 5: Typical view into the site from adjacent housing showing restricted visibility due to foreground features and topography. This view is from the west looking east across the site

### **Views from and within the site.**

These are dominated by adjacent housing although views with the site feature the stream and its existing vegetation. There is a view to the trees in Parr's Park and the Waikumete stream from the elevated area of the site at its northern end.

Views out of the site are limited to little more than a few hundred metres and there are no notable views from the site to its surroundings.

### **Proposed development**

The proposed development is for new dwellings, including detached homes and apartments, and ranging from 2 to five bedroom accommodation. Roads serve access to the dwellings. The strip of land adjacent to and including the stream is to be reserved for environmental and public amenity. This reserve will include a path that connects to a bridge and north through the adjacent site to connect with the Waitakere City proposed pedestrian and cycle network.

### **Residential character and architecture**

The character of the proposed buildings features modest contemporary form and materials; they offer some traditional design references for the detached houses and more contemporary urban forms for the two and three storey apartment type dwellings (house types 2A, 2B and 2C).

The building forms are modulated to provide a domestic scale, and variety of shadow and surface texture.

The ends of the buildings will be in charcoal grey brick or split face block, and the remainder will be shiplap weatherboards, natural finish or a taupe brown. Roofs will be corrugated steel in matt silver/grey. These buildings will have strong visual ends with a softer colour and texture pallet in between.

### **Existing trees**

The proposals include the removal of all existing trees with the exception of the groups of natives identified in the arborist report, and the native trees and shrubs to be found among the general growth in the reserve area. Trees to be retained include the mature totara and the mature kahikatea, both close to the stream, as well as groups of kanuka with their mainly native understorey.

## Storm water management

The development includes two stormwater management areas. One is a pond in the south of the site. This will be planted at its margins with wetland species. A larger area at the north of the site includes a dry attenuation basin as well as permanent wetlands. These will all be planted with native wetland and moisture loving herbaceous and shrubby communities appropriate to the habitat and ground conditions. Areas required for access and maintenance will be kept as mown grass for ease of access. This planting will help to reduce sediments and pollutants in the storm water as it passes through the various bays and before it is discharged to the stream.

## Proposed planting

There will be substantial new tree planting to streets, reserves and front gardens. In reserve areas, particularly along the margins of the stream, this will be native re-vegetation. In streets and private gardens exotic ornamentals and deciduous street trees will be planted, in keeping with the suburban character. Each street will have a different tree. In all, there will be a substantial increase in the vegetation on the site. This will be concentrated along the stream in the reserve and to the street frontage of the houses.



Fig 6: Existing stream area to benefit from weed removal, substantial wetland re-vegetation and will provide excellent waterside habitats. Existing kanuka and manuka will be retained.

## **Fencing**

The rear yards and gardens will be fully fenced to 1.8 m tall for 'stand up' privacy and the side fences will be 1.35 m tall for 'sit down' privacy, the front boundaries will be defined either by retaining walls and planting, or by 0.8 m tall fence and low planting. These fences will be of a sturdy contemporary trellis type combined with vines to give an appropriate level of privacy for the various outdoor living areas.

The fencing adjacent to the reserve and storm water ponds will be standard metal pool type fencing combined with planting for visual amelioration. This fencing will allow visual surveillance of adjacent reserve areas from houses and gardens. At the same time low to medium planting around the fences will integrate them into the landscape.

The planting in the gardens will be of domestic character.

## **Assessment of visual effects**

### **General**

With the proposed development, an increased number of dwellings, structures, roads and hard surfacing would be visible from the immediate vicinity. This would include architecture that is generally in character with the range of types of the buildings at present adjacent to the site. There would also be an increase in planting in the reserve and on the street frontages to be created of the site.

A new wetland is proposed as part of the storm water management system. This includes marginal areas of native wetland plants that will help to increase habitat variety in the area as well as improve appearance and integrate the water management features with revegetation areas.

These improvements together with the removal of weed infestations will more than compensate for the loss of open space and the overall visual effects would be beneficial once the new planting matured and restored habitats help to re-introduce bird life and a healthy ecosystem to the stream environment

The landscape effects of the development would vary with time. As gardens and tree planting increase in size and bulk the conspicuousness of the buildings and new structures would reduce. Any further tree and shrub planting carried out by residents in their gardens would, after 3 to 5 years, begin to play a valuable role in the overall quality of the site.

### **Key views**

The view from West Coast Road into the site will include one of the site entrances but also large areas of re-vegetation planting, so that the overall effect will be positive.

The views into and across the site will all include new planting as well as new housing thanks to the strategic location of the stream.

### **Avoidance and mitigation of adverse effects**

The retention of the established native trees on the site will mitigate the short-term effects of construction before the new tree planting becomes well established. The inclusion of rain gardens in the southern street will moderate run-off to the public storm water disposal system and increase infiltration into the local groundwater. The rain gardens will also contribute to visual amenity, being planted with wetland species.

The use of planted embankments in place of retaining walls will reduce visual impact by reducing the area of hard surface that is visible. Planting on embankments will be an important part of the amenity of the site. Trailing plants will be used above the low retaining walls at the front of lots and will at least partly clothe the retaining structures

### **Conclusion regarding changes in visual character**

The landscape of suburban living areas in this part of Waitakere is presently changing to accommodate medium density infill housing and create a landscape that is more urban in character. The proposed re-development of the site is in keeping with this trend and is in character with the surrounding areas. Little of specific visual merit will be lost from the site and the gains of new planting and public access and habitat restoration will be significant.

The modest but thoughtful quality of the architectural design will offer visual benefits by comparison with the present rather run-down site character.

Overall, the change in visual character and habitat value will be beneficial to the site and its environs.

**NZ HOUSING FOUNDATION  
BABBAGE CONSULTANTS**

423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT

**ARBORIST'S REPORT**



Wilcon Sylvan Parks and Landscape Management  
C/- Willy Coenradi  
341 Rimmer Road, RD2  
Helensville 1250  
Ph: 09-420 6455 Fax: 09-420 6456 Mobile: 021-223 8723  
E-Mail: coenradi@ihug.co.nz

16 June 2006

## Housing Foundation NZ, West Coast Road Development. (Part of 423-429 West Coast Road)

This report should be read in context of the above application and will:

1. Identify tree(s) and vegetation which may be affected by proposed works.
2. Assess condition of individual tree(s).
3. Assess to what extent vegetation may be affected and recommend remedial work/action with a view to minimize (potential) damage to trees)

It is proposed to develop the above site for housing purposes with associated infrastructure and landscaping.

The proposed works and items referred to in this report are generally shown on the attached "Housing Foundation NZ, West Coast Road Development. (Part of 423-429 West Coast Road), vegetation and major features plan 1 & 2".

### Summary:

- The proposed works are located within the General and Restoration **Natural Areas**.
- The majority of vegetation is located along the stream meandering through the site, and consists of areas of exotic weed growth interspersed with occasional native vegetation species. These areas are circled in **yellow** on the above vegetation plans
- There are some smaller areas of more significant native vegetation including a few larger native specimen trees, and mature Kanuka vegetation. These areas and the individual trees are circled in **blue** on the above vegetation plans, with significant specimens identified individually.

### Vegetation on site

#### General;

The development site is part of an area which appears to have been farmed and in pasture until recent times, and since reverted to an unmaintained rough pasture land, with some natural streamside vegetation areas from West Coast Road joining up with an area along the Northern boundary which is in a relatively good condition.

The layout of the site is as per the attached subdivision and layout plans. It is intended to clear all vegetation from the areas circled in **yellow** and landscape, restore and revegetate these areas to the guidelines described in the "native to the west, a guide for planting and restoring the nature of Waitakere City" publication as part of the proposed landscape plans.

The areas circled in **yellow** largely consist of exotic weed species and rough pasture covering in excess of 98% of these areas including species such as:

Botanical Name	Common Name
<i>Solanum mauritianum</i>	Woolly Nightshade

Salix alba	Willow
Ligustrum	Privet
Lonicera sp.	Climbing Honeysuckle
Salix caprea	Pussy Willow

Sporadic natives such as *Cordyline australis* and a few *Cyathea dealbata* can also be found in these areas. Any specimens over 6 metres in height are marked on the Vegetation plans.

The areas covered in **blue** consist of typical streamside vegetation, but can be classified as "species poor", with the predominant species found *Kunzea ericoides* (Kanuka).

The areas marked Ref #5 and #11 are of reasonable quality with a good canopy cover.

Species found include:

Botanical Name	Common Name
<i>Kunzea ericoides</i>	Kanuka
<i>Coprosma robusta</i>	
<i>Myrsine australis</i>	Matipo
<i>Cordyline australis</i>	Cabbage Tree
<i>Dacrydium dacrydioides</i> (1 specimen only)	Kahikatea
<i>Podocarpus totara</i> (1 large specimen only)	Totara

In our opinion all areas marked in blue include native vegetation to the extent that restoration of these areas and enhancing the existing vegetation is preferable over complete clearing and replanting.

It is recommended that these areas are protected from damage during development and construction with suitable protective fencing, which should be installed prior to any works taking place, and maintained for the duration of the project.

Photos and further detail of the vegetation on site



Ref # 15: Photo looking towards West Coast Road consisting of mixed exotic weed species

(not an aerial photo)



Ref # 15/16: Photo taken towards area behind 421 West Coast Road with exotic weed species and a *Cyathea dealbata* (under 3.00m in height) and a 10-15 yr old *Cordyline australis* at appr. 5.00m in height. Both will require removal.

Not shown



Ref # 2: A group of semi-mature *Cordyline australis* up to 8.00m in height, in generally poor condition. These trees are to be removed. 12/15 +



Ref # 17: Photo of *Pinus radiata* shelterbelt, up to 14.00m tall and DBH of up to 400mm. These trees are to be removed. +



Ref # 3, *Pinus radiata* to be removed, Ref# 4 Semi mature *Podocarpus totara*, 17.00m H x 500mm DBH to be retained. The latter is close to a proposed driveway access. Ensure driveway is located outside tree dripline, and protective fencing is in place during construction,



Ref # 5: Photo of area with mature native revegetation species, including Ref# 3&4. Area to be retained and fenced during construction, additional enhancement planting as per landscaping plan



Ref # 18. Small area with juvenile (planted) revegetation species < 5yrs of age. Includes *Phormium*, *Cordyline australis* and *Coprosma robusta*. This area will be within a future building lot, and all vegetation is to be removed



Ref #7. Large *dacrydium dacrydioides* (Kahikatea) appr. 18.00m in height and 500mm DBH. This tree located within area Ref #6 and is to be retained. ✓



Ref #6, area vegetated with up to 20% naturally occurring native revegetation species (*Cordyline*, *Coprosma* etc.) all under 3.00m in height, and exotic weed species (Mainly *Privet*, *Salix alba*). Tree Ref#7 is visible to the left. It is proposed to restore the native streamside vegetation in this area as per the "native to the west, a guide for planting and restoring the nature of Waitakere City"



Ref # 8, As per Ref# 6, but including few larger *Cordyline australis*. Much of the exotic weed cover in this area has already been cleared.

It is proposed to restore the native streamside vegetation in this area as per the "native to the west, a guide for planting and restoring the nature of Waitakere City"



Ref #12, photo showing vegetation within this area circled in yellow on the vegetation map. Only weed species occur in these areas, except for the *Cordyline australis*- ref #13. This area will be cleared and landscaped as per the attached plans, with the *Cordyline* retained, to be protected with suitable fencing during construction. A large stormwater detention pond is also proposed within this area.



Photo of area Ref#12 towards NE corner. The *Cordyline* (Ref #14) is also visible. This tree is in close vicinity of the proposed access road, but if possible should be retained and fenced during construction.



Photo of area Ref #12, looking East from Ref #13, showing 95+% of exotic weed species such as *Salix caprea*, privet, interspersed with the odd *Coprosma robusta* and *Myrsine australis* less than 3.00m in height. This area is to be cleared, with the proposed access road from the existing housing development to be constructed on the left, and the remainder landscaped as per the landscape plans. All native plantings to be to the standards described in the "native to the west, a guide for planting and restoring the nature of Waitakere City" publication.



Ref #10, large, old *Pyrus* ( Pear) tree, appr. 11.00m H x 550mm DBH in good

condition. Tree to be retained, protective fencing erected during construction, and incorporated in the proposed landscape design. There is another large pear tree also marked Ref #10 close by which appears to be within the proposed esplanade reserve. To be retained as above.



Photo from across the stream on the Western boundary of the proposed development, looking back to area Ref# 11.

This area includes part of the proposed esplanade reserve along the Northern boundary which is vegetated with good quality mature Kanuka, *Coprosma robusta*, *Myrsine australis*, *Cyathea*, and a range of understory species such as *Carex* and ground ferns. There is some light to moderate weed infestation, which is to be addressed as part of the proposed development, and enhancement plantings undertaken as per the "native to the west, a guide for planting and restoring the nature of Waitakere City" publication.

#### **Impact/adverse effects on existing vegetation**

As outlined in this report it is intended to either preserve areas with a good native vegetation cover present, or clear and revegetate other areas where the existing native vegetation cover is of such poor quality that clearing and revegetation is considered a more appropriate option.

The bulk of the development will take place within already cleared areas, or areas largely void of significant vegetation.

It is noted however that the large Totara tree and other vegetation included within the area of significant vegetation marked Ref #5 may be within a proposed driveway alignment. It is highly recommended that the driveway is relocated to well outside the dripline of this tree and other significant vegetation present.

## Mitigation works

Although the adverse effects on any protected or significant vegetation is very minor in nature, it is proposed to implement a comprehensive landscaping and revegetation plan.

This will seek to provide a high level of visual amenity and functionality, as well as restoration of the streamside native ecosystem.

It is considered that this will more than mitigate any adverse impacts which may be caused by the development

## Assessment of vegetation using the General Natural Area Criteria

Rule Ref #	Description	Assessed effect
2a	The extent to which vegetation alteration adversely affects amenity values and neighbourhood character	The removal of weed species and subsequent revegetation of affected areas will improve amenity values and neighbourhood character to well beyond existing levels.
2b	The extent to which the vegetation alteration will threaten natural ecosystems	The removal of the weedcover could potentially cause erosion runoff into the stream. This will be addressed as part of the main Resource Consent application for the proposed works
2c	The extent to which vegetation alteration creates, contributes to or exacerbates stability problems	Nil
2d	The extent to which development is located or can be designed in a way that avoids the need to remove vegetation, and in particular the removal of any trees which are notable examples of their species	It is proposed to where possible locate any development outside any areas of significant or protected vegetation.
2e (A74)	<p>The extent to which vegetation alteration is necessary:</p> <ul style="list-style-type: none"> <li>• To accommodate development otherwise permitted by the plan</li> <li>• To ensure the safety or integrity of existing development by the plan</li> <li>• For pruning to provide light</li> <li>• For pruning to preserve public views</li> </ul>	The works are proposed To accommodate development otherwise permitted by the plan
2f	The extent to which vegetation alteration adversely affects plant health	Minor. The proposed works will require the removal of some protected vegetation, the adverse effects will however be fully mitigated as outlined in this report

		and attached landscape plans
2g	The effect the vegetation alteration adversely affects the historical, cultural or spiritual significance of any site or waahi tapu of significance to Iwi or archaeological site	Nil
2h	The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off the site and/ or through payment or provision of a financial contribution	The adverse effects will be fully mitigated as outlined in this report and attached landscape plans
2i	The extent to which the vegetation alteration reduces the extent, range and linkages between vegetation, fauna habitats and natural features	When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the range and linkages between vegetation, fauna habitats and natural features
2j	The effect the vegetation alteration can be offset by restoration or enhancement around and within the area subject to the application	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2k	The extent to which vegetation alteration adversely affects the significance, natural character or landscape value of any natural features	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the significance, natural character or landscape value of any natural features
2l	The extent to which the proposed vegetation alteration is for development proposed in a relative Operational Reserve Management Plan, Parks concept plan, current WCC Parks Strategy or current operative Regional Parks Management Plan	N/A

#### Assessment of vegetation using the Restoration Natural Area Criteria

Rule Ref #	Description	Assessed effect
2a	The extent to which vegetation alteration adversely affects the overall resilience, biodiversity and integrity of the Green Network.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the overall resilience, biodiversity and integrity of the Green Network as

		well a being complementary to the aims of the Twin Streams project.
2b	The extent to which vegetation alteration reduces the ability to create linkages between vegetation, fauna habitats or natural features and landforms.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the ability to create linkages between vegetation, fauna habitats or natural features and landforms.
2c	The extent to which vegetation alteration adversely affects the significance, natural character or landscape value of any natural features.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the significance, natural character or landscape value of any natural features.
2d	The extent to which trees which are notable examples of their species can be retained..	It is recommended that several large significant native and exotic trees are retained as part of the development. No notable trees are proposed for removal.
2e	The extent to which vegetation alteration adversely affects the mauri (life force) of native vegetation.	Nil
2f	The extent to which vegetation alteration adversely affects heritage or amenity values.	When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve amenity values.
2g	The effect the vegetation alteration can be offset by restoration or enhancement around and within the area subject to the application	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2h	The extent to which vegetation alteration creates, contributes to, or exacerbates stability problems.	Minor in the short term only, the proposed restoration and enhancement of the streamside vegetation areas when complete will fully mitigate any stability

		issues.
2i	The extent to which the proposed development could be positioned on any area of the site within a General Natural Area.	The proposed development, wherever possible will be located within a General Natural Area
2j	The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off site and/or through payment or provision of a financial contribution.	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2k	The extent to which the vegetation alteration adversely affects plant health.	Minor. The proposed works will require the removal of some protected vegetation, the adverse effects will however be fully mitigated as outlined in this report and attached landscape plans

**A suitably qualified Arborist will be in attendance at the following stages:**

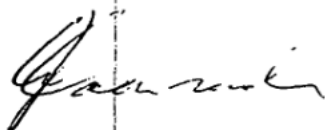
Setting out	Arborist to verify
Prior to commencement of work	Arborist to approve protective fencing
During construction	Arborist to monitor compliance with RC conditions in regards to vegetation
Completion of construction	Arborist to check for damage

**Recommended conditions:**

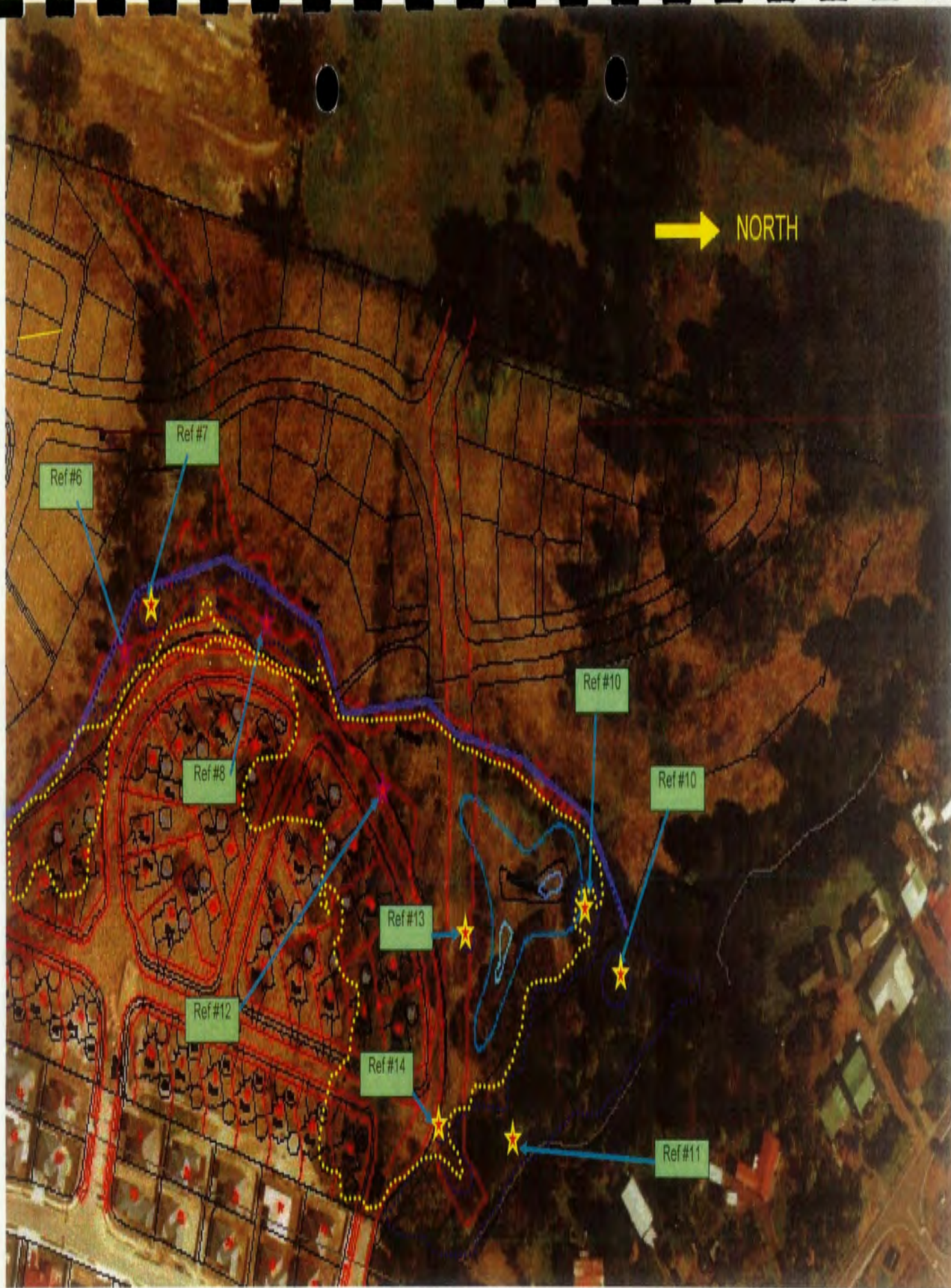
It is recommended that the following conditions are included as part of the Resource Consent:

- A suitably qualified Arborist to be in attendance at critical stages as outlined in the above table.
- Area adjacent works envelope to be temporarily fenced to prevent damage to desirable vegetation.

Yours sincerely



Willy Coenradi.  
Wilcon Sylvan Parks and Landscape Management



Housing Foundation NZ, West Coast Road Development. (Part of 423-429 West Coast Road), vegetation and major features, Sheet 2

Date: 12 June 2006

Approved by:

Drawn by: Willy Coenradi

Scale: Not To Scale



Wilson Sylvan Parks and Landscapes Management

C/- Willy Coenradi

6A Domett Crescent

OREWA New Zealand

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E-Mail: coenradi@wslm.co.nz

## **NZ HOUSING FOUNDATION**

423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT

## **WEED MANAGEMENT PLAN**

## Introduction

All weed species listed below will be destroyed and removed from the site. Particular attention will be paid to the removals of invasive exotic woody and herbaceous weed species along the watercourse so that extensive re-vegetation with native species to form wetland and riparian communities can take place effectively.

Weeds will be removed before re-vegetation planting and follow up weed management will treat and remove any re-growth or missed areas of weed as specified in the table.

Specific methods for managing the weed species identified on the site are set out in the table below.

The re-vegetation planting species, stock sizes and densities to be used in the areas currently infested by weed are summarised in the plant schedules and located on the landscape concept plan.

TABLE OF WEED MANMAGEMENT TECHNIQUES				
weed scientific & common name	weed removal program			
	Initial treatment	treatment after one month	treatment after five weeks (treatment after five weeks in summer or if applicable or treatment after two months in winter)	ongoing control: treatment after six months, treatment after twelve months, treatment after eighteen months & two years
<i>Hedychium gardnerianum</i> and <i>H.flavescens</i> : Gingers	Spray using Escort (5g/15L) with pulse penetrant.	Repeat initial action on any ginger still showing signs of life. Dig up rhizome after specimen is dead and dispose of to the dump.	All areas are to be covered by cambium mulch to a minimum depth of 100mm once initial spraying and weed removal is complete.	Check site after six months, twelve months, eighteen months and two years for signs of any weed regrowth or re-establishment. Any new growth to be spot sprayed using Roundup and removed by hand two weeks later. Any non-noxious minor superficial weeds to be removed by hand. Replace mulch or weed mat where it has moved or thinned out. Cover noxious weed 'flare up' sites with an extra 50mm depth of mulch.
<i>Ulex europaeus</i> : Gorse	Spray Roundup (1%) with pulse penetrant.	Repeat initial action on any Gorse still showing signs of life. Cut down and dispose of dead specimens to the dump.	Initial revegetation planting may proceed at this point if weed eradication has been successful.	
<i>Acacia</i> spp: Wattle	Cut down and remove to dump any specimens & paint stump with Roundup (20%).	Repeat initial action on any specimens still showing signs of life.		
<i>Cortaderia selloana</i> & <i>C.jubata</i> : Pampas Grass	Spray Roundup (1%) with pulse penetrant. Remove any seed heads carefully to rubbish dump. Ensure complete wetting of foliage. Spray after flowering.	Repeat initial action on any specimens still showing signs of life. Cut down and dispose of dead specimens to the dump.		
<i>Ligustrum sinense</i> & <i>L.lucidum</i> . Privet	Cut down and remove to dump any specimens & paint stump with Roundup (20%) or Escort (5g/10 litre + 10ml of pulse penetrant.	Repeat initial action on any specimens still showing signs of life.		

<i>Pennisetum clandestinum</i> Kikuyu Grass	Spray Roundup (2%).	Repeat initial action on any specimens still showing signs of life.		
<i>Lonicera japonica</i> Japanese honeysuckle	Spray Roundup (2%) or Escort (35g. per 100L water) manually clear including roots removing all parts to dump.	Repeat initial action on any specimens still showing signs of life.		
<i>Paraserianthes lophantha</i> (syn. <i>Albizzia lophantha</i> ) Brush wattle	Fell trees, pull up seedlings and dispose.	Repeat initial action on any missed specimens or emerging seedlings		
<i>Solanum mauritianum</i>	Pull out young plants including roots. Cut down large shrubs and trees. Paint stump with glyphosate at 1 part to 5 parts water plus 'Pulse' penetrant.	Repeat initial action on any missed specimens or emerging seedlings		
<i>Salix alba</i> , <i>S. fragilis</i> (crack willow) and <i>Salix caprea/cinerea</i> (sallow/pussy willow)	Fell trees remove all parts of tree to dump & paint stump with Roundup (20%) or Escort (5g/10 litre + 10ml of pulse penetrant.) or Metsulfuron (35 g. per 100 L water).	Repeat initial action on any missed specimens or emerging seedlings		
<i>Ipomoea indica</i> Morning glory	Cut down and remove twining stems from other vegetation. Paint stumps and cut stems with one of the following Glyphosate 1 part per 4 parts of water Alternatively after cutting, the vines away the remaining weed foliage rooted in the ground may be sprayed with one of the mixtures: Glyphosate:100mls + 20mls Pulse per 10 litres of water Banvine:120mls per 10 litres of water Yates Woody eedkiller 120mls per 10 litres of water			

## General requirements

The weed management plan is to be read in conjunction with the planting proposals and landscape concept. All herbicides must be used strictly according to the manufacturer's instructions and with all safety fully observed. Take particular care to avoid any spillage or drift of any herbicide into the water flow. All weeds in the water must be destroyed by mechanical removal.

The aim of the weed management program is to remove and clear the weed species from the proposed planting site until such a time as the replacement planting can form a reasonable protection against re-establishment of weed species- i.e. until canopy cover is achieved.

All work shall be carried out by a competent and experienced tradesman with suitable experience for the work to be undertaken. Keep all proposed planting areas weed free, remove weeds by hand where possible with minimal disturbance to mulch. Any site rubbish and undesirable debris is to be removed from the site before planting commences.

## Herbicide application

- Check local authority for the need to publicly notify intention to spray herbicides.
- Apply herbicide when the plants are actively growing. Carefully follow manufacturer's instructions and wear protective clothing.
- Do not spray in windy weather or if rain is expected in the next few hours
- Leave plants in the ground until the foliage and the roots have died off
- Make sure herbicide does not come in contact with non-target plants
- Do not apply herbicide to the water or to plants emerging from the water. These are to be removed mechanically

Any spraying shall be in accordance with NZS 8409:1999 Agrochemical Users Code Of Practice.

## Mulching

A 100mm layer of cambium mulch (80-100mm when settled) shall be evenly spread over the revegetation planting areas, which must be free of debris and approved by the project engineer or their

representative prior to placement of the mulch. All mulch is to be certified free of weed material or seed. Mulch is to be kept clear of the trunks or bases of new or retained planting. Care shall be taken to ensure that no mulch enters the sea or any intertidal area. Revegetation planting should commence during the planting season and as soon as possible once the weed control has been implemented.

## Replanting

Extensive re-vegetating planting is to be carried out on the site including the areas where the existing weed growth will be removed. The species to be used for re-vegetating the variety of habitats are listed in the table below. The reference letter refers to the landscape master plan.

Re-vegetation shrub and small tree pioneer mix ('C' on landscape masterplan); to be chosen from:

Riparian areas Open and higher stream bank		Typical spacing	Other areas (outside flood plain)		Typical spacing	Stock sizes
<i>Cordyline australis</i>	Ti kouka Cabbage tree	1 m	<i>Coprosma robusta</i>	karamu	1.5 m	PB3 minimum
<i>Cortaderia fulvida</i>	toetoe	1.2 m	<i>Aristotelia serrata</i>	makomako	1.2 m	
<i>Phormium tenax</i>	Harakeke flax	1 m	<i>Sophora microphylla</i>	Kowhai	0.9 m	
<i>Leptospermum scoparium</i>	Manuka Tee tree	1.2 m	<i>Coprosma lucida</i>	Shining karamu	1.2	
<i>Hoheria populnea</i>	Houhere lacebark	1.2 m	<i>Cyathea medullaris</i>	Mamaku	1.2	
<i>Carpodetus serratus</i>	Putaputaweta marbleleaf	1 m	<i>Cyathea dealbata</i>	Ponga	1.2	
<i>Shefflera digitata</i>	pate	1 m	<i>Leptospermum scoparium</i>	Manuka	1.2	
<i>Coprosma propinqua</i>	mingmingi	1 m	<i>Myrsine australis</i>	Mapou Red matipo	0.9	
<i>Hedycarya arborea</i>	Porokaiwhiri Pigeon wood	1 m	<i>Melicytus ramiflorus</i>	Mahoe Whiteywood	1.2	
			<i>Solanum aviculare</i>	poroporo	1.5 m	
			<i>Pseudopanax arboreus</i>	Fivefinger whauwhaupaku	1.2	

D: Grass like, flax like and herbaceous plants for wetland re-vegetation: for emergents, marginals and stream banks, wet ground ('D' on landscape masterplan);

Generally minimum stock size to be 1 L, typical spacing to be 750 mm apart; species to be chosen from:

Marginal emergents: marsh areas and below winter water levels		Lower stream bank: ground above common water levels but subject to flooding		Upper bank: Generally moist ground with high watertable occasional flooding	
<i>Baumea articulata</i>	Sedge tussock	<i>Blechnum novae zelandiae</i>	kiokio	<i>Dianella nigra</i>	Turutu
<i>Cyperus ustulatus</i>	Giant umbrella sedge	<i>Cyperus ustulatus</i>	Giant umbrella sedge	<i>Cyathea dealbata</i>	Ponga Silver tree fern
<i>Baumea teretifolia</i>		<i>Phormium tenax</i>	harakeke	<i>Cyatea medullaris</i>	Mamaku
<i>Carex lessoniana</i>	Rautahi	<i>Cortaderia fulvida</i>	Northern toetoe	<i>Carex flagellifera</i>	
<i>Carex virgata</i>	Small swamp sedge	<i>Carex virgata</i>	Small swamp sedge	<i>Carex lessoniana</i>	
<i>Juncus pallidus</i>	Giant rush	<i>Dicksonia squarrosa</i>	wheki	<i>Baumea tenax</i>	
<i>Carex secta</i>	purei	<i>Carex secta</i>	purei	<i>Phormium cookianum</i>	wharariki
<i>Typha orientalis</i>	raupo				



**Key**

**Soft Landscape Elements**  
For planting plans refer to accompanying report

A - Proposed Ornamental Specimen Trees mostly deciduous for shade, front yards & rear property boundaries

Specimen shrub

Proposed hedge 0.8m High

Proposed hedge 1.35m High

Proposed hedge 1.8m High

Proposed low to medium height shrub planting indicating ground covers

**Hard Landscape Elements**

Proposed fence 0.8m high for front of properties

Proposed fence 1.35m high for between properties

Proposed fence 1.8m high for rear of properties

Proposed post type fence 1.2m high between properties and street setback and around street setback (posts)

Proposed keystone retaining wall (various heights)

Proposed concrete footpath

Proposed deck/patio adjacent to house

Proposed sleeping stores in public

Proposed paving at entrance to house

Proposed concrete driveway and footpath

Proposed driveway/outdoor utilities area

NOTE: Provision within each house of two been allowed for car occupants to have the ability to entrance and exit their vehicles. What is shown is for diagrammatic purposes only

Revision	Description	Drawn	Checked
----------	-------------	-------	---------

Drawing Status

**SOUL**

landscape architects

101-103 Northcote Road, Auckland, New Zealand  
Phone: 09 307 1200 Fax: 09 307 1201  
Email: info@soul.co.nz  
www.soul.co.nz

Client: NZ Housing Foundation & Babbage			
Project: West Coast Road Housing Development			
Drawing: Typical Garden Layout			
Title: House Type 4A			
Drawing LSP-03	Job	SOUL-05/06-161	
Number: 1 of 4	Number:		
Scale: 1:125 @ A3	Date: 19/06/06	Drawn: AH	

Key

Soft Landscape Elements

For planting notes refer to accompanying report

- A - Proposed Ornamental Specimen: Focus mostly desirable for streets, front yards & near property boundaries
- B - Proposed native, medium to large trees for stream edge and other re-vegetation areas
- C - Proposed re-vegetation of native shrubs and small trees/plants etc
- D - Proposed grass like, low and sub-tropical plants for wetland re-vegetation for marginality, margins and stream banks, wet ground
- E - Proposed grass like, low and sub-tropical plants for wetland re-vegetation for marginality, margins and stream banks, wet ground
- F - Proposed low to medium height shrub planting for stream and garden areas including ground covers
- G - Proposed native grasses and sub-tropical plants
- H - Boundary of existing vegetation (refer to site report)

Hard Landscape Elements

- I - Proposed fence 0.8m high for level of properties
- J - Proposed fence 1.35m high for between properties
- K - Proposed fence 1.8m high for rear of properties
- L - Proposed post and rail fence 1.2m high between properties and stream meadows and around stream water ponds
- M - Proposed key stone retaining wall (sub-tropical heights)
- N - Proposed concrete/loophole
- O - Proposed deck/patio adjacent to houses
- P - Proposed sloping decks
- Q - Proposed paving of entrance to houses
- R - Proposed sub-tropical material of the area
- S - Proposed concrete driveway and paths
- T - Proposed paving for traffic carrying areas and road shoulders

NOTE: This landscape master plan is indicative only in relation to the layout of the typical house garden design. Please refer to sheets LSP-03 and LSP-04 for typical house landscape design.

Revision Description Drawn/Checked

Drawing Status

**SOUL**  
LANDSCAPE ARCHITECTS  
1000 10th Street, Suite 100, San Francisco, CA 94103  
Phone: 415.774.1000 Fax: 415.774.1001  
www.soul-landscape.com

Client: NZ Housing Foundation & Babbage

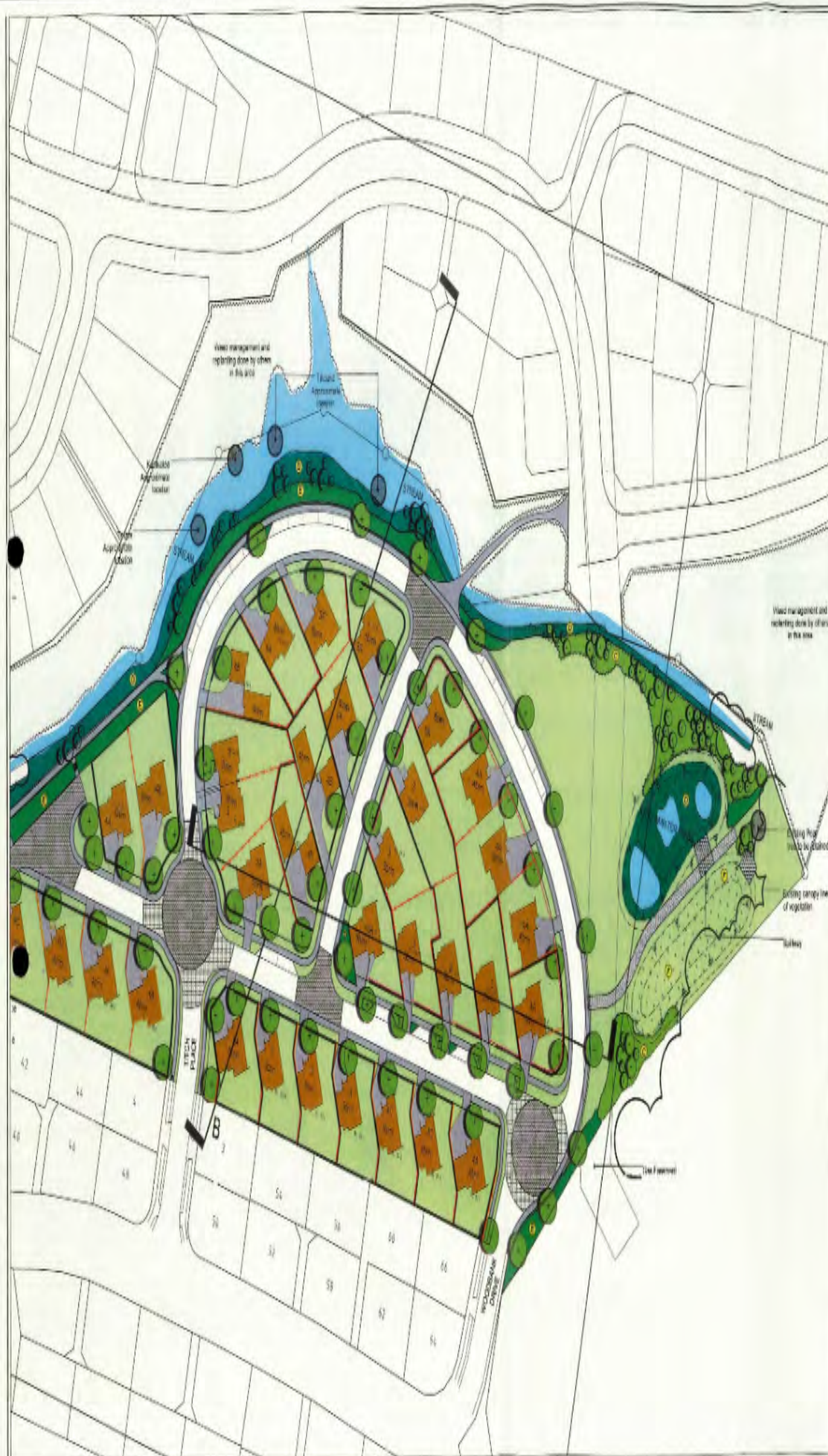
Project: West Coast Road Housing Development

Drawing Landscape Master Plan and Title: Typical Garden Layout

Drawing LSP-01 Job Number: SOUL-05/06-161

Scale: 1:500 (A1) Date: 16/06/06 Drawn: AH





**Key**

**Soft Landscape Elements**  
For planting areas refer to accompanying report

- A - Proposed Ornamental specimen trees ready for planting for streets, front yards & rear property boundaries
- B - Proposed native, medium to large trees for screen edge and other vegetation areas
- C - Proposed re-vegetation of native shrubs and small trees (screen edge)
- D - Proposed grass lawns and herbaceous plants for wetland re-vegetation for erogenous margins and stream banks, wet ground
- E - Proposed grass lawns and herbaceous plants for wetland re-vegetation for erogenous margins and stream banks, wet ground
- F - Proposed low to medium height shrub planting for screen and garden areas reducing ground cover
- G - Proposed shrubs for ground cover in situational ponds

**Hard Landscape Elements**

- Proposed fence 1.8m high for front of properties
- Proposed fence 1.8m high for rear of properties
- Proposed fence 1.8m high for rear of properties
- Proposed post type fence 1.2m high between properties and stream reserves and around storm water ponds
- Proposed key stone retaining wall (variable heights)
- Proposed concrete footpath
- Proposed deck/patio adjacent to houses
- Proposed stepping stones
- Proposed paving at entrance to houses
- Proposed car/driveway/utensil area
- Proposed concrete driveway and paths
- Proposed paving for traffic calming areas and street shade

**NOTE:** This landscape master plan is indicative only in relation to the layout of the typical house garden design. Please refer to sheets LSP-01 and LSP-02 for typical house landscape design.

Revision	Description	Drawn	Checked

**Drawing Status:**

**SOUL**  
landscape architects

1770a-0211 (copy) 10/05/2016  
1770a-0211 (copy) 10/05/2016  
1770a-0211 (copy) 10/05/2016  
1770a-0211 (copy) 10/05/2016

**Client:** NZ Housing Foundation & Babbage

**Project:** West Coast Road Housing Development

**Drawing:** Landscape Master Plan

**Title:**

**Drawn:** LSP-02  
**Number:** Sheet 2 of 4

**Job Number:** SOUL-05/06-161

**Scale:** 1:500 (A1)  
1:1000 (A3)

**Date:** 16/06/06

**Drawn:** AH



**NZ HOUSING FOUNDATION**

423-429 WEST COAST ROAD, HENDERSON  
HOUSING DEVELOPMENT

**PLANTING SCHEDULES**

# NZ Housing Foundation Babbage Consultants

## West Coast Road Housing

Planting proposal typical species for planting types A, B, C, D and E  
This schedule is to be read in conjunction with the Landscape Masterplan  
drawing numbers LSP 01 and LSP 02

**A** Ornamental mostly deciduous trees for streets, front yards and rear boundaries;  
Each street will have a different tree to give distinction and orientation. Species to be  
chosen from:

Larger trees for streets/front yards where space available		Medium trees for Front yards and Rear boundaries.		Stock sizes
<i>Fraxinus oxycarpa</i> 'Raywood'	Claret ash	<i>Cornus florida</i>	Flowering dogwood	PB40 minimum
<i>Quercus coccinea</i>	Pin oak	<i>Jacaranda mimosaeifolia</i>	Jacaranda	PB40 minimum
<i>Quercus rubra</i>	Red oak	<i>Largestroemia indica cvs.</i>	Crepe myrtle	PB40 minimum
<i>Fraxinus excelsior</i> 'Aurea'	Golden ash	<i>Albizia julibrissim</i>	Silk tree	PB40 minimum
<i>Paulownia tomentosa</i>	Foxglove tree	<i>Magnolia x soulangeana</i>	magnolia	PB40 minimum
<i>Liquidamber styraciflua</i>	Sweet gum	<i>Pistacia chinensis</i>	Chinese pistacio	PB40 minimum
<i>Vitex lucens</i>	Puriri			PB40 minimum

**B** Native, medium to large trees, for stream edge, and other re-vegetation areas; to  
be chosen from:

Stream edge		Other areas on dryer ground		Stock sizes
<i>Laurelia novae-zelandiae</i>	pukatea	<i>Vitex lucens</i>	Puriri	PB40 minimum
<i>Dysoxylum spectabile</i>	kohekohe	<i>Podocarpus totara</i>	Totara	PB40 minimum
<i>Cordyline australis</i>	Ti kouka	<i>Alectryon excelsa</i>	titoki	PB40 minimum
<i>Vitex lucens</i>	Puriri	<i>Phyllocladus trichomanoides</i>	Tanekaha Celery pine	PB40 minimum
<i>Rhopalostylis sapida</i>	nikau	<i>Kunzea ericoides</i>	kanuka	PB40 minimum

**C** Re-vegetation shrub and small tree pioneer mix; to be chosen from:

Riparian areas - open and higher stream bank		Typical spacing	Other areas - outside flood plain		Spacing	Stock sizes
<i>Cordyline australis</i>	Ti kouka Cabbage tree	1 m	<i>Coprosma robusta</i>	karamu	1.5 m	PB3 min
<i>Cortaderia fulvida</i>	toetoe	1.2 m	<i>Aristotelia serrata</i>	makomako	1.2 m	PB3 min
<i>Phormium tenax</i>	Harakeke flax	1 m	<i>Sophora microphylla</i>	Kowhai	0.9 m	PB3 min
<i>Leptospermum scoparium</i>	Manuka Tee tree	1.2 m	<i>Coprosma lucida</i>	Shining karamu	1.2	PB3 min
<i>Hoheria populnea</i>	Houhere lacebark	1.2 m	<i>Cyathea medullaris</i>	Mamaku	1.2	PB3 min
<i>Carpodetus serratus</i>	Putaputa- weta marbleleaf	1 m	<i>Cyathea dealbata</i>	Ponga	1.2	PB3 min
<i>Shefflera digitata</i>	pate	1 m	<i>Leptospermum scoparium</i>	Manuka	1.2	PB3 min
<i>Coprosma propinqua</i>	mingmingi	1 m	<i>Myrsine australis</i>	Mapou Red matipo	0.9	PB3 min
<i>Hedycaria arboria</i>	Poro- kaiwhiri Pigeon wood	1 m	<i>Melicytus ramiflorus</i>	Mahoe whiteywood	1.2	PB3 min
			<i>Solanum aviculare</i>	poroporo	1.5 m	PB3 min
			<i>Pseudopanax arboreus</i>	Five finger Whauwhau- paku	1.2	PB3 min

**D** Grass like, flax like and herbaceous plants for wetland re-vegetation: for emergents, marginals and stream banks, wet ground; generally minimum stock size 1 L, typical spacing to be 750 mm apart; species to be chosen from:

Marginal emergents: marsh areas and below winter water levels		Lower stream bank: ground above common water levels but subject to flooding		Upper bank: Generally moist ground with high water table and occasional flooding	
<i>Baumea articulata</i>	Sedge tussock	<i>Blechnum novae zelandiae</i>	kiokio	<i>Dianella nigra</i>	Turutu
<i>Cyperus ustulatus</i>	Giant umbrella sedge	<i>Cyperus ustulatus</i>	Giant umbrella sedge	<i>Cyathea dealbata</i>	Ponga Silver tree fern
<i>Baumea teretifolia</i>		<i>Phormium tenax</i>	harakeke	<i>Cyatea medullaris</i>	Mamaku
<i>Carex lessoniana</i>	Rautahi	<i>Cortaderia fulvida</i>	Northern toetoe	<i>Carex flagellifera</i>	
<i>Carex virgata</i>	Small swampsedge	<i>Carex virgata</i>	Small swampsedge	<i>Carex lessoniana</i>	
<i>Juncus pallidus</i>	Giant rush	<i>Dicksonia squarrosa</i>	wheki	<i>Baumea tenax</i>	
<i>Carex secta</i>	purei	<i>Carex secta</i>	purei	<i>Phormium cookianum</i>	wharariki
<i>Typha orientalis</i>	raupo				

**E** Low to medium height shrub planting for reserve and garden areas, to include:

For planting adjacent to reserves	For planting adjacent to gardens and streets	
<i>Coprosma repens</i> 'Poor Knights'	<i>Hebe</i> 'First Light'	
<i>Coprosma</i> 'Hawerea'	<i>Hebe</i> 'Wiri Charm'	
<i>Coprosma</i> 'Taiko'	<i>Coleonema</i> 'Winter Charm'	
<i>Coprosma</i> x <i>kirkii</i>	<i>Rhaphiolepis umbellata</i>	
<i>Hebe</i> 'First Light'	<i>Yucca filimentosa</i> 'Ivory'	Specimen shrub
<i>Hebe</i> 'Wiri Charm'	<i>Felicia amelloides</i>	
<i>Phormium</i> 'Green Dwarf'	<i>Grevillea</i> 'Mt. Tambouritha'	
	<i>Strobilanthes anisophyllus</i>	
	<i>Viburnum</i> 'Emerald Lustre'	Specimen shrub
	<i>Luculia grandifolia</i>	Specimen shrub
	<i>Grevillea</i> 'Red Cloud'	

F sedges for ground cover in attenuation ponds

Scientific name	Common name			Minimum stock size
<i>Carex flagellifera</i>				1 litre
<i>Carex litorosa</i>				
<i>Carex comans</i> cultivars	maurea			

## **Appendix 6**

### **Earthworks Plan**

WEST COAST ROAD

MEDIUM INTENSITY  
HOUSING SUBDIVISION

EARTHWORKS AND CIVIL  
CONSTRUCTION

for

NZ HOUSING FOUNDATION



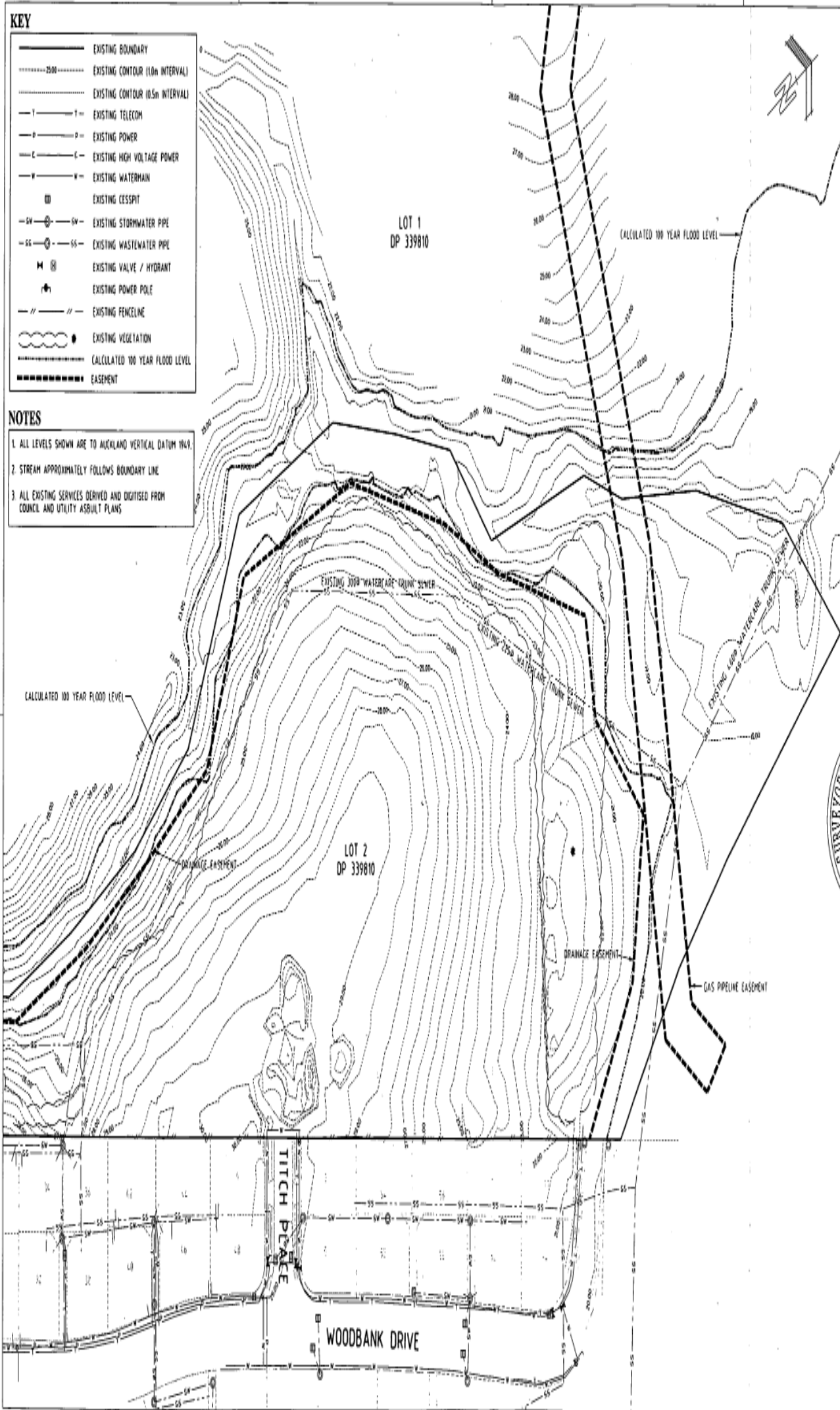
JOB No.	42608
JUNE 2006	
DRAWING No.	42608 C00
REVISION:	CONSENT

# KEY

	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EXISTING TELECOM
	EXISTING POWER
	EXISTING HIGH VOLTAGE POWER
	EXISTING WATERMAIN
	EXISTING CESSPIT
	EXISTING STORMWATER PIPE
	EXISTING WASTEWATER PIPE
	EXISTING VALVE / HYDRANT
	EXISTING POWER POLE
	EXISTING FENCELINE
	EXISTING VEGETATION
	CALCULATED 100 YEAR FLOOD LEVEL
	EASEMENT

# NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
2. STREAM APPROXIMATELY FOLLOWS BOUNDARY LINE.
3. ALL EXISTING SERVICES DERIVED AND DIGITISED FROM COUNCIL AND UTILITY ASSESSMENT PLANS.



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK

DRAWING REVISIONS



CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**TOPOGRAPHICAL  
PLAN  
(SHEET 1)**

	DATE	INITIAL
DESIGNED		
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	23/6/06	TP

SCALE (A1)

1:500

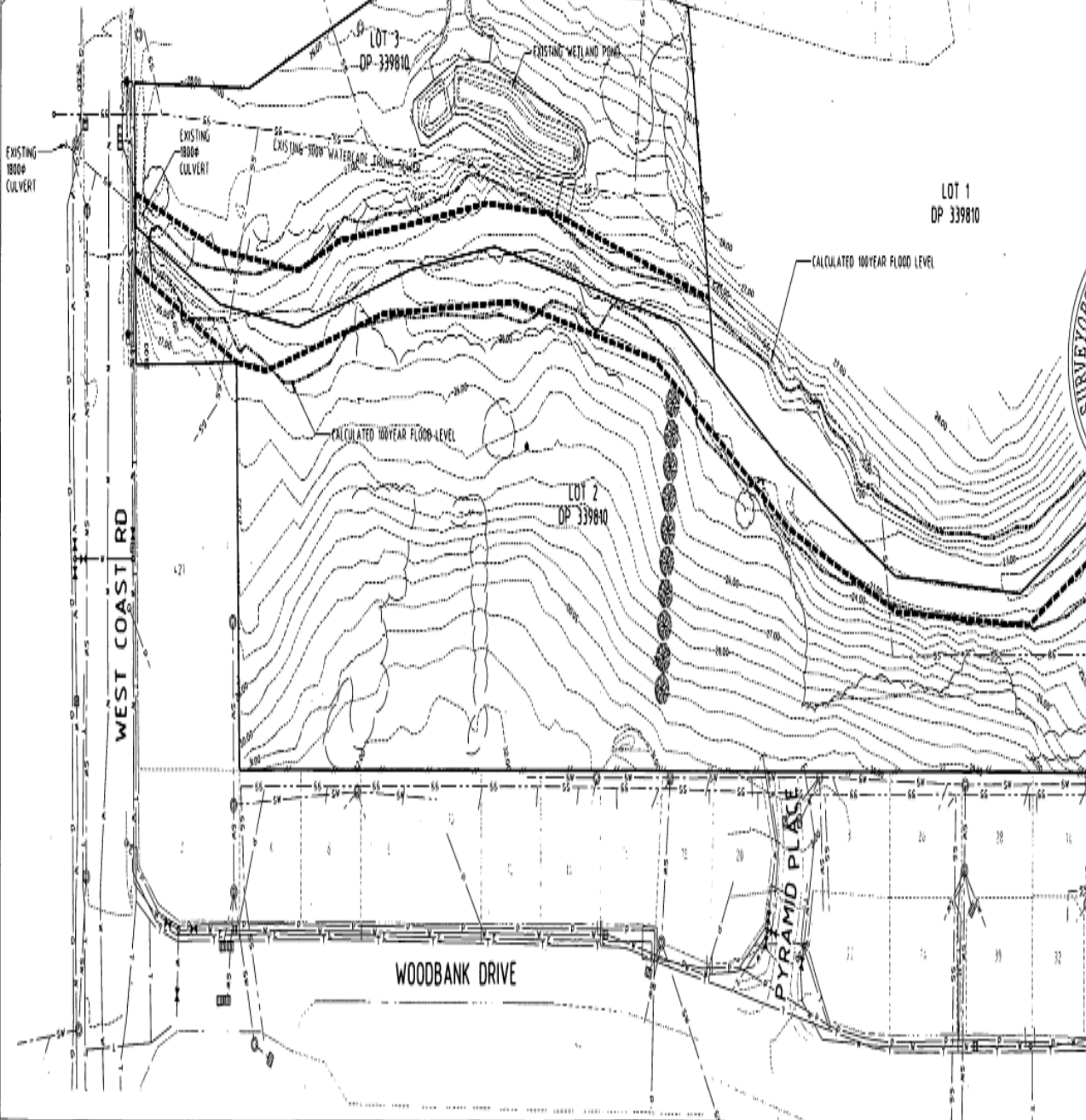
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C01	

# KEY

---	EXISTING BOUNDARY
---	EXISTING CONTOUR (10m INTERVAL)
---	EXISTING CONTOUR (0.5m INTERVAL)
---	EXISTING TELECOM
---	EXISTING POWER
---	EXISTING HIGH VOLTAGE POWER
---	EXISTING WATERMAIN
---	EXISTING CESSPIT
---	EXISTING STORMWATER PIPE
---	EXISTING WASTEWATER PIPE
---	EXISTING VALVE / HYDRANT
---	EXISTING POWER POLE
---	EXISTING FENCELINE
---	EXISTING VEGETATION
---	CALCULATED 100 YEAR FLOOD LEVEL
---	EXISTING EASEMENT

## NOTES

1. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1949.
2. STREAM APPROXIMATELY FOLLOWS BOUNDARY LINE
3. ALL EXISTING SERVICES DERIVED AND DIGITISED FROM COUNCIL AND UTILITY ASSESSMENT PLANS



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REV	DATE	DESCRIPTION	DRAWN	CHECK

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CONSULTANTS

108 PANGLOSS STREET  
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AUCKLAND 1 - NEW ZEALAND  
PHONE 09-339 8080 - FAX 09-337 1170  
info@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**TOPOGRAPHICAL  
PLAN  
(SHEET 2)**

DESIGNED	DATE	INITIAL
DRAWN	JUNE 2006	FK
CHECKED	23/06/06	IP
APPROVED		

SCALE (M)

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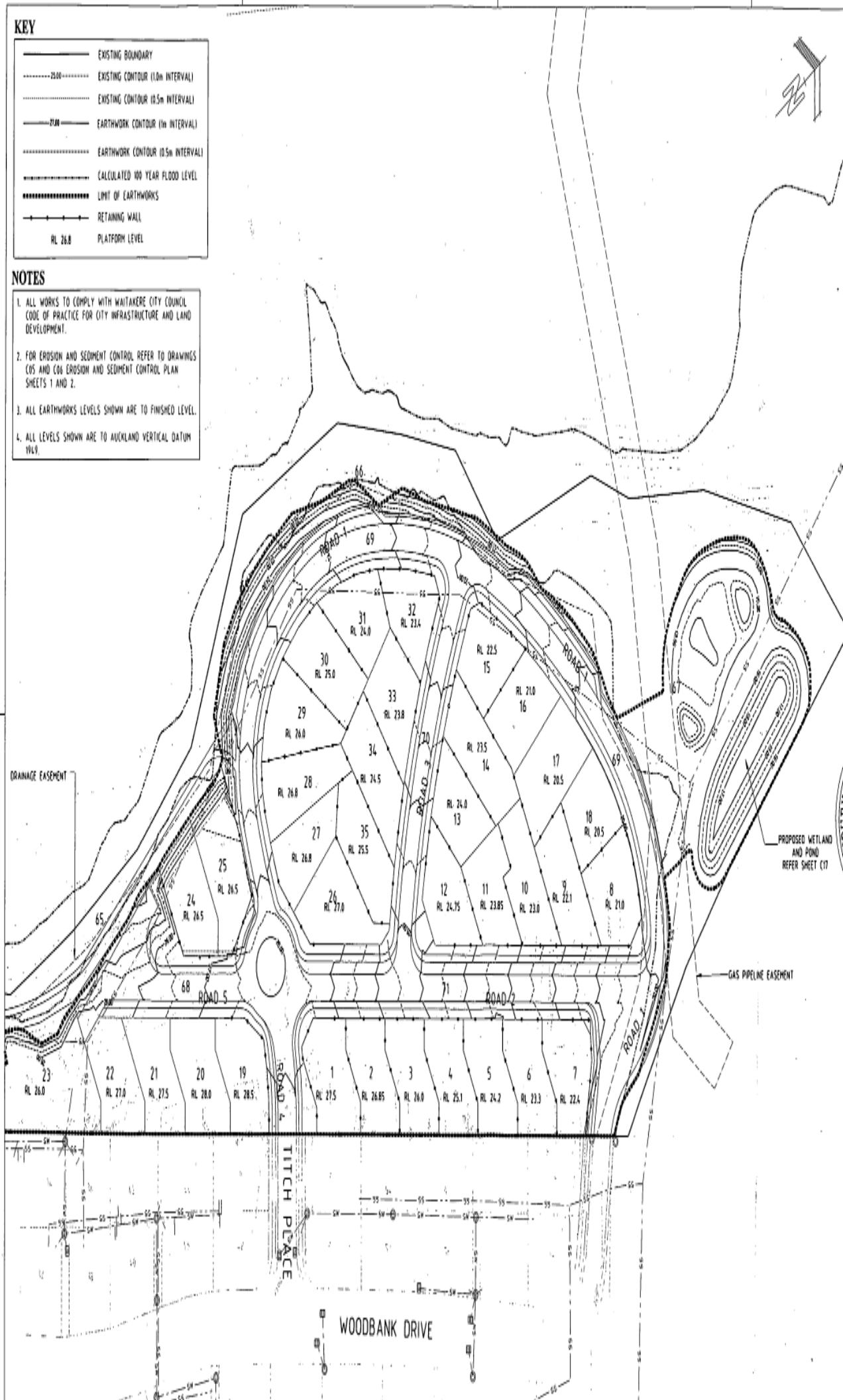
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C02	

# KEY

	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EARTHWORK CONTOUR (1m INTERVAL)
	EARTHWORK CONTOUR (0.5m INTERVAL)
	CALCULATED 100 YEAR FLOOD LEVEL
	LIMIT OF EARTHWORKS
	RETAINING WALL
	RL 26.8 PLATFORM LEVEL

# NOTES

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DRAWINGS C05 AND C06 EROSION AND SEDIMENT CONTROL PLAN SHEETS 1 AND 2.
3. ALL EARTHWORKS LEVELS SHOWN ARE TO FINISHED LEVEL.
4. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM (VLD).



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REV	DATE	DESCRIPTION	DRAWN	CHECK



CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE

**EARTHWORKS PLAN  
(SHEET 1)**

DESIGNED	DATE	INITIAL
	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	13/06/06	FK

SCALE (A1)

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C03	

# KEY

	EXISTING BOUNDARY
	EXISTING CONTOUR (10m INTERVAL)
	EXISTING CONTOUR (0.5m INTERVAL)
	EARTHWORK CONTOUR (1m INTERVAL)
	EARTHWORK CONTOUR (0.5m INTERVAL)
	CALCULATED 100 YEAR FLOOD LEVEL
	LIMIT OF EARTHWORKS
	RETAINING WALL
	RL 26.8 PLATFORM LEVEL

# NOTES

1. ALL WORKS TO COMPLY WITH WAITAKERE CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE AND LAND DEVELOPMENT.
2. FOR EROSION AND SEDIMENT CONTROL REFER TO DRAWINGS C05 AND C06 EROSION AND SEDIMENT CONTROL PLAN SHEETS 1 AND 2.
3. ALL EARTHWORKS LEVELS SHOWN ARE TO FINISHED LEVEL.
4. ALL LEVELS SHOWN ARE TO AUCKLAND VERTICAL DATUM 1969.

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DRAWING REVISIONS



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astro@babbage.co.nz

CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

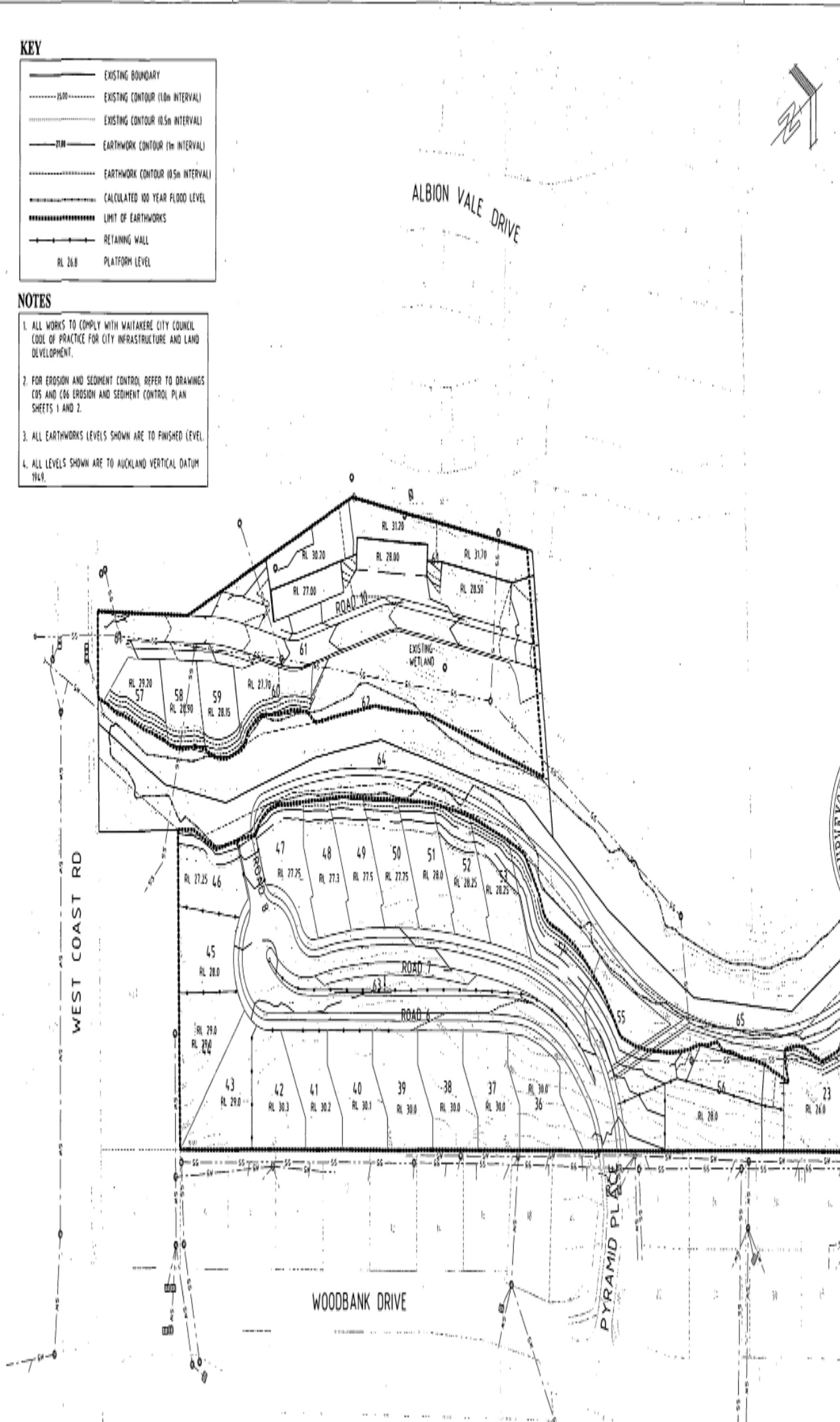
DRAWING TITLE  
**EARTHWORKS PLAN  
(SHEET 2)**

	DATE	INITIAL
DESIGNED	JUNE 2006	FK
DRAWN	JUNE 2006	FK
CHECKED		
APPROVED	23/06/06	JP

SCALE (A1)

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C04	



**Appendix 5**

**Subdivision Plan**

# EXISTING EASEMENTS IN CROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OIL AND GAS SUPPLY	LOT 2 DP 339810	834429.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	613572.4	WAITAKERE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	607022.2	
RIGHT OF WAY	LOT 3 DP 339810	607022.1	

# PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY	(A)	LOT 61 HERON	LOTS 57, 58, 59 AND 60 HERON

# PROPOSED EASEMENTS IN CROSS

PURPOSE	SHOWN	GRANTEE
RIGHT OF WAY	(A) (B)	WAITAKERE CITY COUNCIL

# AREA SCHEDULE

LOTS 1 - 61 INCL.	RESIDENTIAL	2,868,210m
LOTS 62 AND 64 - 67 INCL.	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	1,604,000m
LOTS 69 AND 71 INCL.	ROAD TO VEST	1,244,900m
TOTAL		5,717,110m

# KEY

STAGE BOUNDARY	EXISTING EASEMENT BOUNDARY	PROPOSED EASEMENT BOUNDARY	CENTRELINE OF EXISTING STREAM (INDICATIVE ONLY - NOT FIXED)
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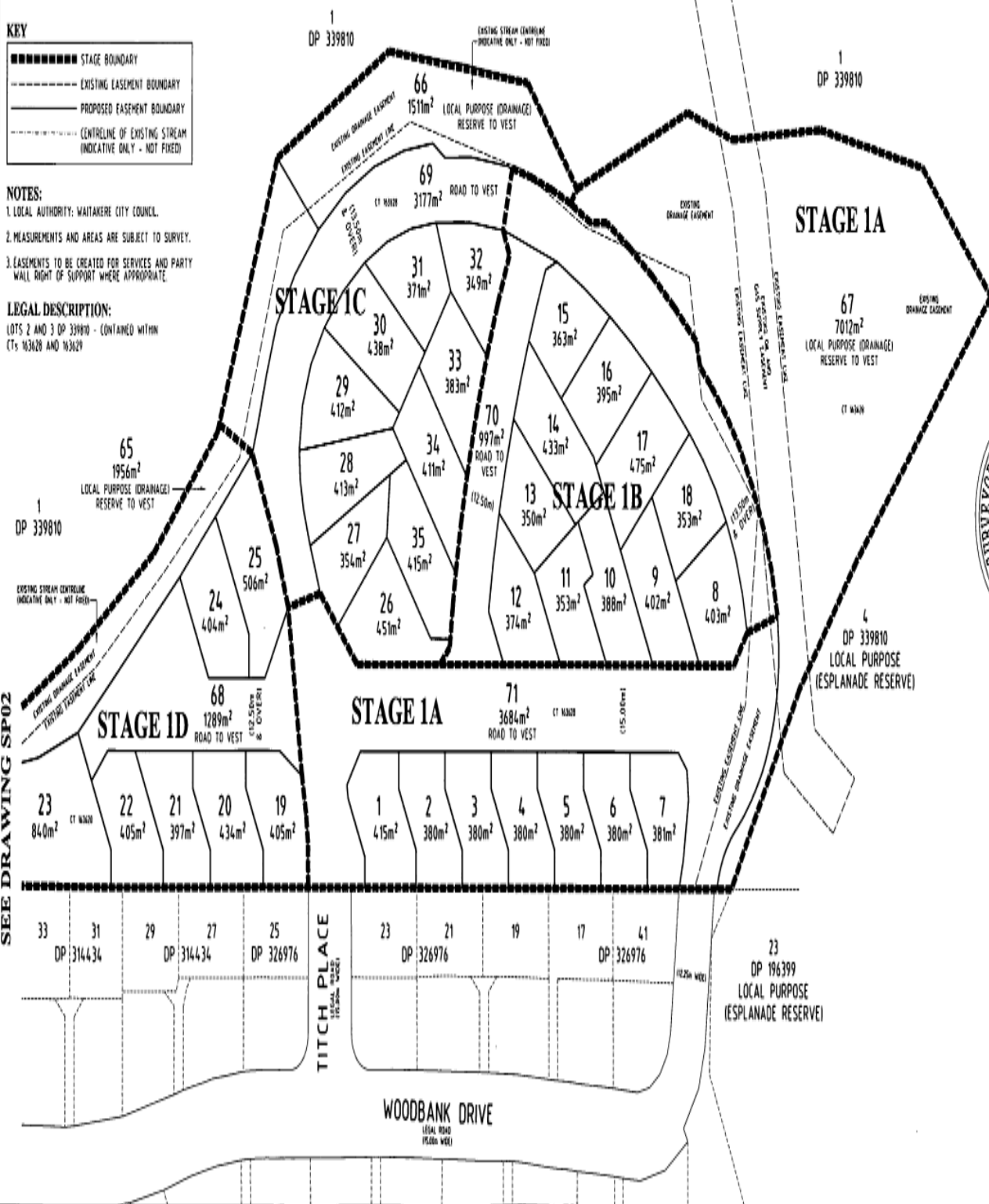
# NOTES:

1. LOCAL AUTHORITY: WAITAKERE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

# LEGAL DESCRIPTION:

LOTS 2 AND 3 DP 339810 - CONTAINED WITHIN CTs 163628 AND 163629

SEE DRAWING SP02



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DRAWING NOTES

REV	DATE	DESCRIPTION	DRAWN	CHECK



CLIENT / PROJECT  
**WEST COAST ROAD HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**  
DRAWING TITLE  
**PROPOSED SUBDIVISION OF LOTS 2 AND 3 DP 339810 (SHEET 1 OF 2)**

DESIGNED	DATE	INITIAL
	JUNE 2008	JA
DRAWN	JUNE 2008	WJD
CHECKED	23-06-08	KM
APPROVED	23-06-08	IP

SCALE (A1)  
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JOB NUMBER	DRAWING NUMBER	REVISION
42608	SP01	



### PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO SUPPLY TELECOM, WATER, ELECTRICITY AND GAS	(A)	LOT 61 HEREON	LOTS 57, 58, 59 AND 60 HEREON

### PROPOSED EASEMENTS IN GROSS

PURPOSE	SHOWN	GRANTEE
RIGHT OF WAY	(A) (B)	WAIKARE CITY COUNCIL

### EXISTING EASEMENTS IN GROSS

PURPOSE	SERVIENT TENEMENT	CREATED BY	GRANTEE
OL AND GAS SUPPLY	LOT 2 DP 339810	8344219.1	NATURAL GAS CORPORATION OF NEW ZEALAND LTD.
DRAINAGE	LOTS 2 AND 3 DP 339810	6135712.4	WAIKARE CITY COUNCIL
STORMWATER DETENTION AND DRAINAGE	LOT 3 DP 339810	6070221.2	
RIGHT OF WAY	LOT 3 DP 339810	6070221.1	

### AREA SCHEDULE

LOTS 1 - 61 INCL.	RESIDENTIAL	2,888.2ha
LOTS 62 AND 64 - 67 INCL.	LOCAL PURPOSE (DRAINAGE) RESERVE TO VEST	1,604.0ha
LOTS 63 AND 68 - 71 INCL.	ROAD TO VEST	1,244.9ha
TOTAL		5,737.1ha

### KEY

—————	STAGE BOUNDARY
-----	EXISTING EASEMENT BOUNDARY
-----	PROPOSED EASEMENT BOUNDARY
-----	CENTRELINE OF EXISTING STREAM (INDICATIVE ONLY - NOT FIXED)

### NOTES:

1. LOCAL AUTHORITY: WAIKARE CITY COUNCIL.
2. MEASUREMENTS AND AREAS ARE SUBJECT TO SURVEY.
3. EASEMENTS TO BE CREATED FOR SERVICES AND PARTY WALL RIGHT OF SUPPORT WHERE APPROPRIATE.

### LEGAL DESCRIPTION:

LOTS 2 AND 3 DP 339810 - CONTAINED WITHIN CTs 163628 AND 163629

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REV	DATE	DESCRIPTION	DRAWN	CHECK



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AUCKLAND 1 - NEW ZEALAND  
PHONE 09 - 379 9900 FAX 09 - 377 1170  
auckland@babbage.co.nz

CLIENT / PROJECT

WEST COAST ROAD  
HOUSING DEVELOPMENT  
FOR

NZ HOUSING FOUNDATION

DRAWING TITLE

PROPOSED SUBDIVISION  
OF LOTS 2 AND 3 DP 339810  
(SHEET 2 OF 2)

DESIGNED	DATE	INITIAL
	JUNE 2009	JA
DRAWN	JUNE 2009	MJD
CHECKED	23/06/09	RM
APPROVED	23/06/09	JP

SCALE (A1)

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	SP02	

WEST COAST RD

ALBION VALE DRIVE

STAGE 3

STAGE 2B

STAGE 2A

STAGE 1D

WOODBANK DRIVE  
LEGAL ROAD  
(10.25m WIDE)

PYRAMID PLACE  
LEGAL ROAD  
(10.25m WIDE)

WOODBANK DRIVE  
LEGAL ROAD  
(10.25m WIDE)

# KEY

	EXISTING BOUNDARY
	CALCULATED 100% AEP FLOOD LEVEL

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DRAWING NOTES

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CLIENT / PROJECT  
**WEST COAST ROAD  
 HOUSING DEVELOPMENT**  
 FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**ROADING PLAN  
 (SHEET 1)**

DESIGNED	DATE	INITIAL
	JUNE 2006	FK
DRAWN	JUNE 2006	OW
CHECKED		
APPROVED	25/06/06	JP



SCALE (A1)  
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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C20	

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DRAWING NOTES

# KEY

	EXISTING BOUNDARY
	CALCULATED AEP FLOOD LEVEL



WEST COAST RD

ALBION VALE DRIVE

WOODBANK DRIVE

PYRAMID PLACE

REV	DATE	DESCRIPTION	DRAWN	CHECK



101 FAIRVIEW STREET  
PO BOX 2007  
AUCKLAND 1 - NEW ZEALAND  
PHONE 09-379 8800 - FAX 09-371 1170  
web@babbage.co.nz

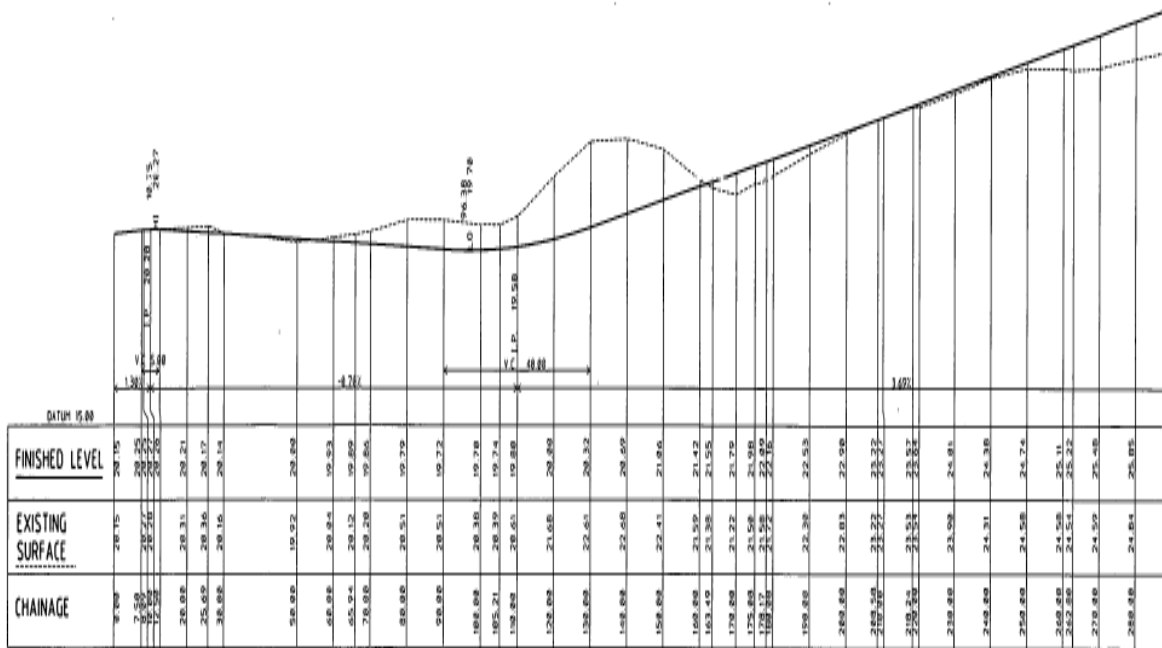
CLIENT / PROJECT  
**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
FOR  
**NZ HOUSING FOUNDATION**

DRAWING TITLE  
**ROADING PLAN  
(SHEET 2)**

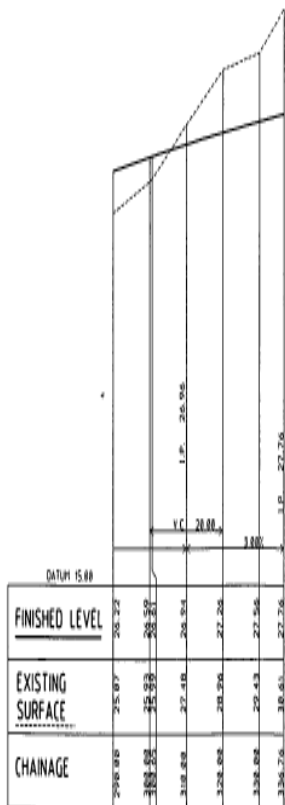
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APPROVED	31/8/08	P

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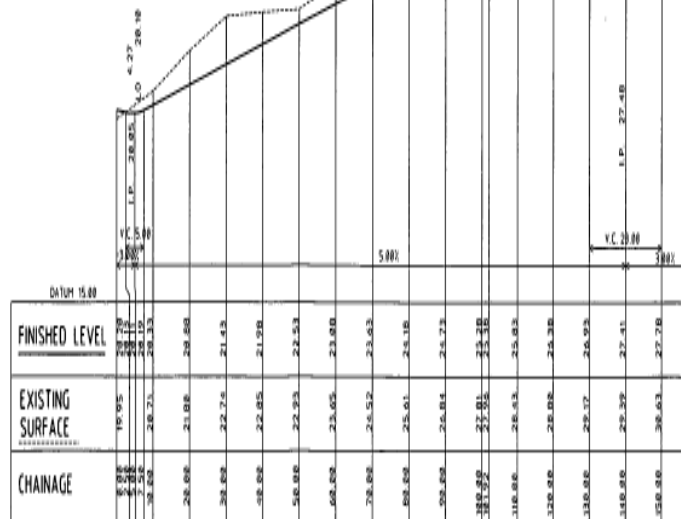
JOB NUMBER	DRAWING NUMBER	REVISION
42608	C21	



ROAD 1 LONGITUDINAL SECTION



ROAD 1 LONGITUDINAL SECTION CONTINUES



ROAD 2 LONGITUDINAL SECTION

REV	DATE	DESCRIPTION	DRAWN	CHECK



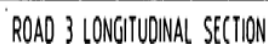
CLIENT / PROJECT  
 WEST COAST ROAD  
 HOUSING DEVELOPMENT  
 FOR  
 NZ HOUSING FOUNDATION

DRAWING TITLE  
 ROAD LONGITUDINAL  
 SECTIONS  
 (SHEET 1)

DESIGNED	DATE	INITIAL
	JUNE 06	FK
DRAWN	JUNE 06	GM
CHECKED		
APPROVED	23/06/06	IF

SCALE (M)  
 HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C22	



## GRANTING REVISIONS



DRAWING TITLE  
ROAD LONGITUDINAL  
SECTIONS  
(SHEET 2)

	DATE	INITIAL
DESIGNED	JUNE 06	FK
DRAWN	JUNE 06	GW
CHECKED		
APPROVED	23/06/06	IP

SCALE (A1)

HORT 1:500 VERT 1:100

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C23	-

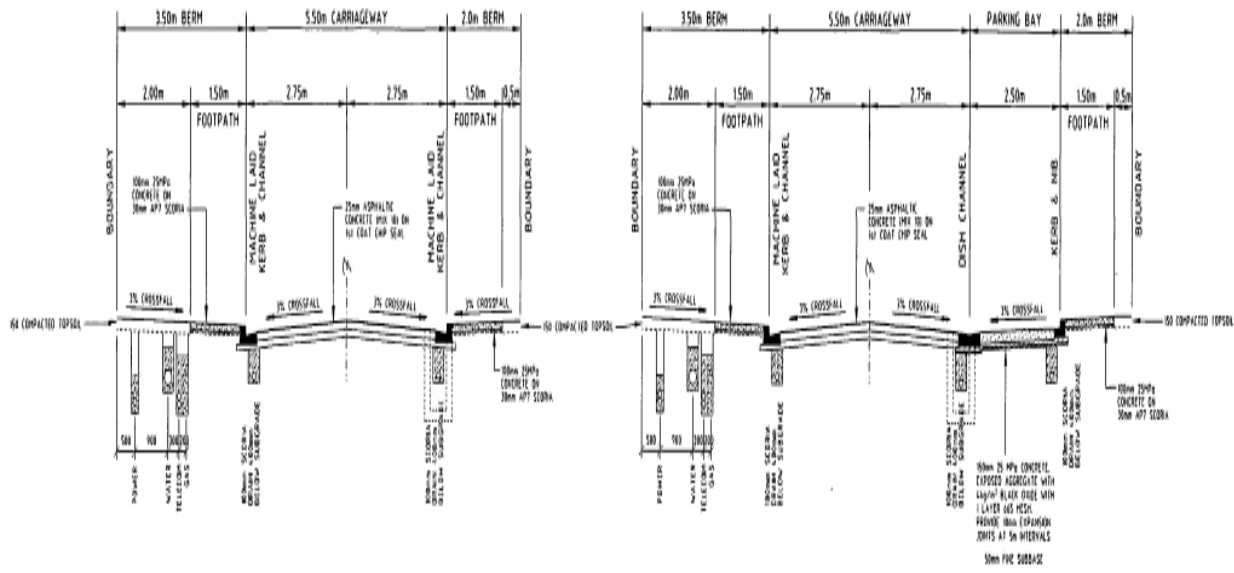


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ROAD LONGITUDINAL  
SECTIONS  
(SHEET 3)

SCALE (A1)

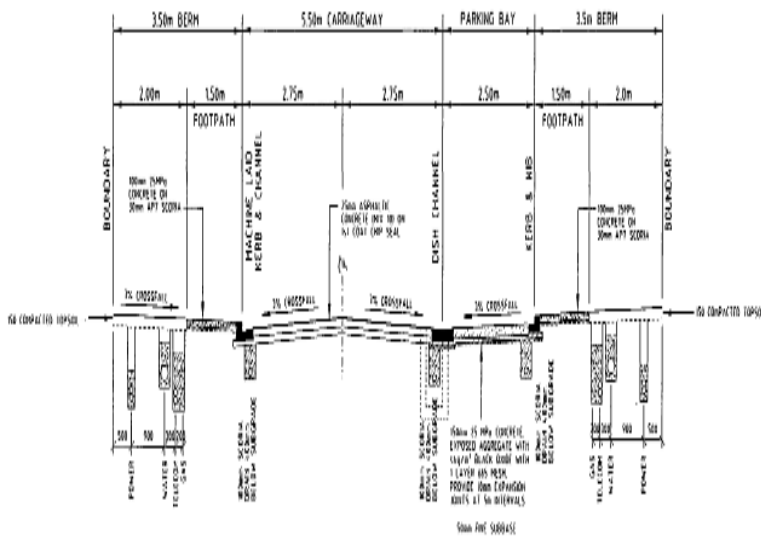
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42608	C24	-

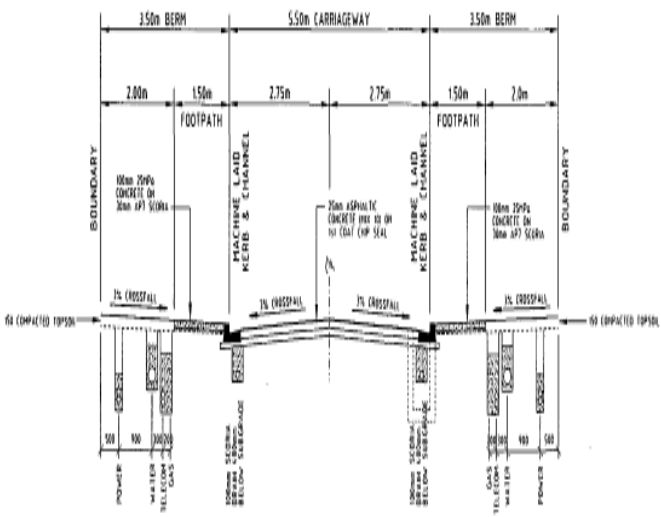


TYPICAL CROSS SECTION ROAD 1  
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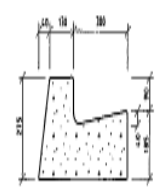
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 112.63-282.93m



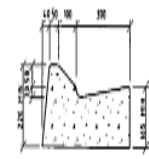
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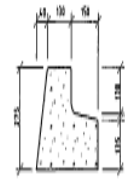
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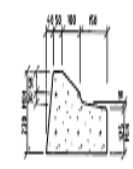
VERTICAL KERB & CHANNEL



MOUNTABLE KERB & CHANNEL



VERTICAL KERB & NIB



MOUNTABLE KERB & NIB

INSITU KERB DETAILS  
 SCALE 1:10



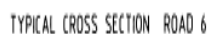
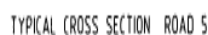
CLIENT/PROJECT  
 WEST COAST ROAD  
 HOUSING DEVELOPMENT  
 FOR

NZ HOUSING FOUNDATION  
 DRAWING TITLE  
 ROAD  
 CROSS SECTIONS  
 (SHEET 1)

DATE	INITIAL
DESIGNED	JUNE 2008
DRAWN	JUNE 2008
CHECKED	23/06/08
APPROVED	23/06/08

SCALE (A1)  
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JOB NUMBER	DRAWING NUMBER	REVISION
42608	C25	



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PHONE 09 • 379 9980 • FAX 09 • 377 1170  
admiral@admiral.co.nz

1:50

JOB NUMBER	DRAWING NUMBER	REVISION
42608	C26	-

DRAWING NOTES



DRAWING TITLE  
RETAINING WALL  
SECTIONS ALONG  
EASTERN BOUNDARY

	DATE	INITIAL
DESIGNED	AUG 2006	FK
DRAWN	AUG 2006	FK
CHECKED	AUG 2006	DR
APPROVED		

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JOB NUMBER	DRAWING NUMBER	REVISION
42608	M01	-

## **Appendix 4**

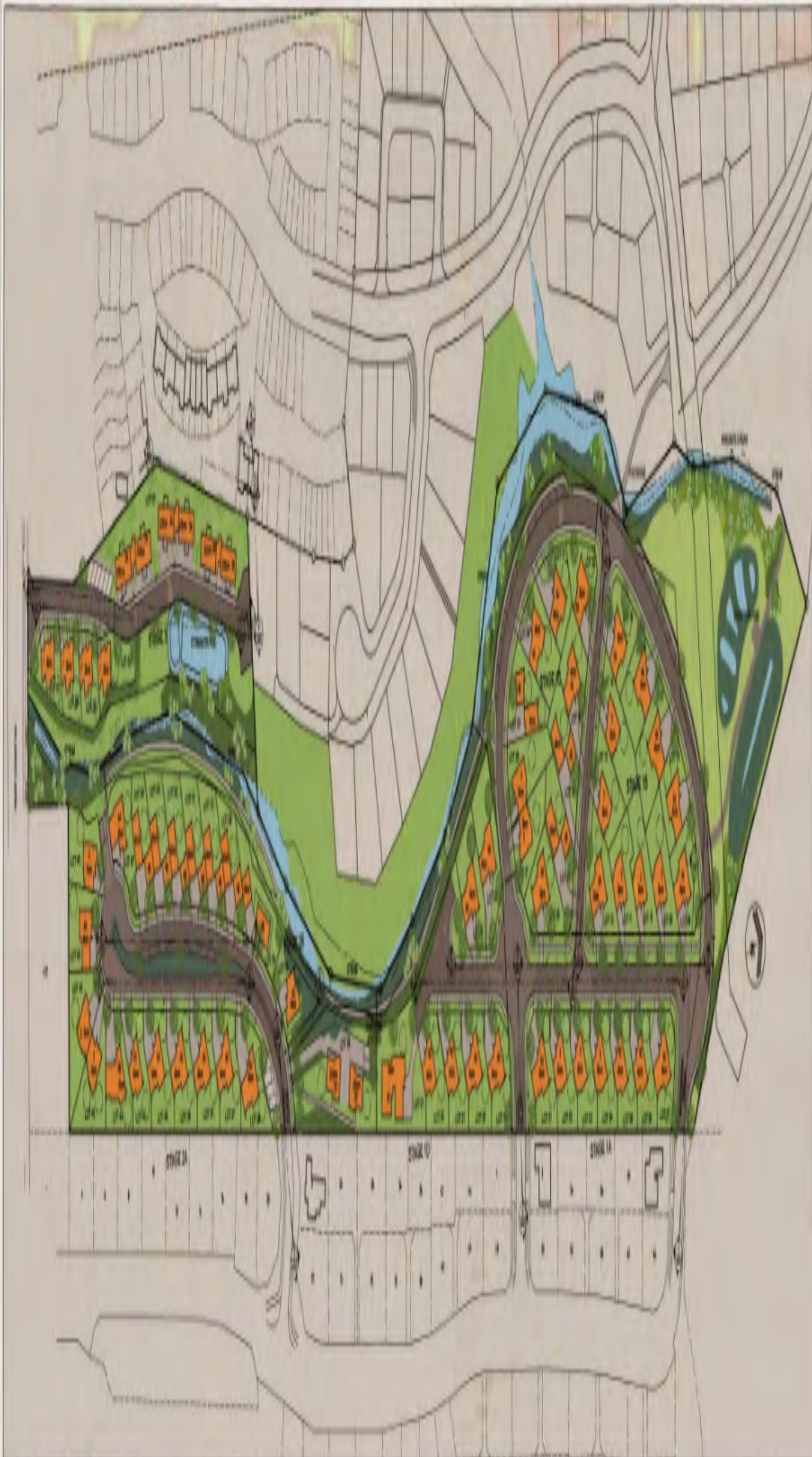
### **Architectural Plans**

Babbage Consultants Limited, P O Box 2027, 109 Fanshawe Street, Auckland 1, New Zealand - Phone + (09) 379 9980 Fax + (09) 377 1170

A303	Street Elevation – sheet 3	X	X																	
A304	Stage 1A Bulk & Location Study	X	X																	
A305	Stage 1B Bulk & Location Study	X	X																	
A306	Stage 1B Bulk & Location Study	X	X																	
A307	Stage 1C Bulk & Location Study	X	X																	
A308	Stage 1C Bulk & Location Study	X	X																	
A309	Stage 1D Bulk & Location Study	X	X																	
A310	Stage 2A Bulk & Location Study	X	X																	
A311	Stage 2A & 2B Bulk & Location Study	X	X																	
A312	Stage 2B Bulk & Location Study	X	X																	
A313	Stage 3 Bulk & Location Study	X	X																	
A401	Coverage Calculations	X	X																	
Soul Report	Soul Visual Assessment Report 19.06.06	X	X																	

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<b>DELIVERY METHOD</b>		H	H																	
M = Mail		C = Courier		H = Hand		F = Fax														
<b>REASON FOR ISSUE</b>		X	RC																	
A = Approval		BC = Building Consent		C = Construction		QS = Quantity Survey														
P = Preliminary		RC = Resource Consent		T = Tender		X = Information														
						Z = Other														

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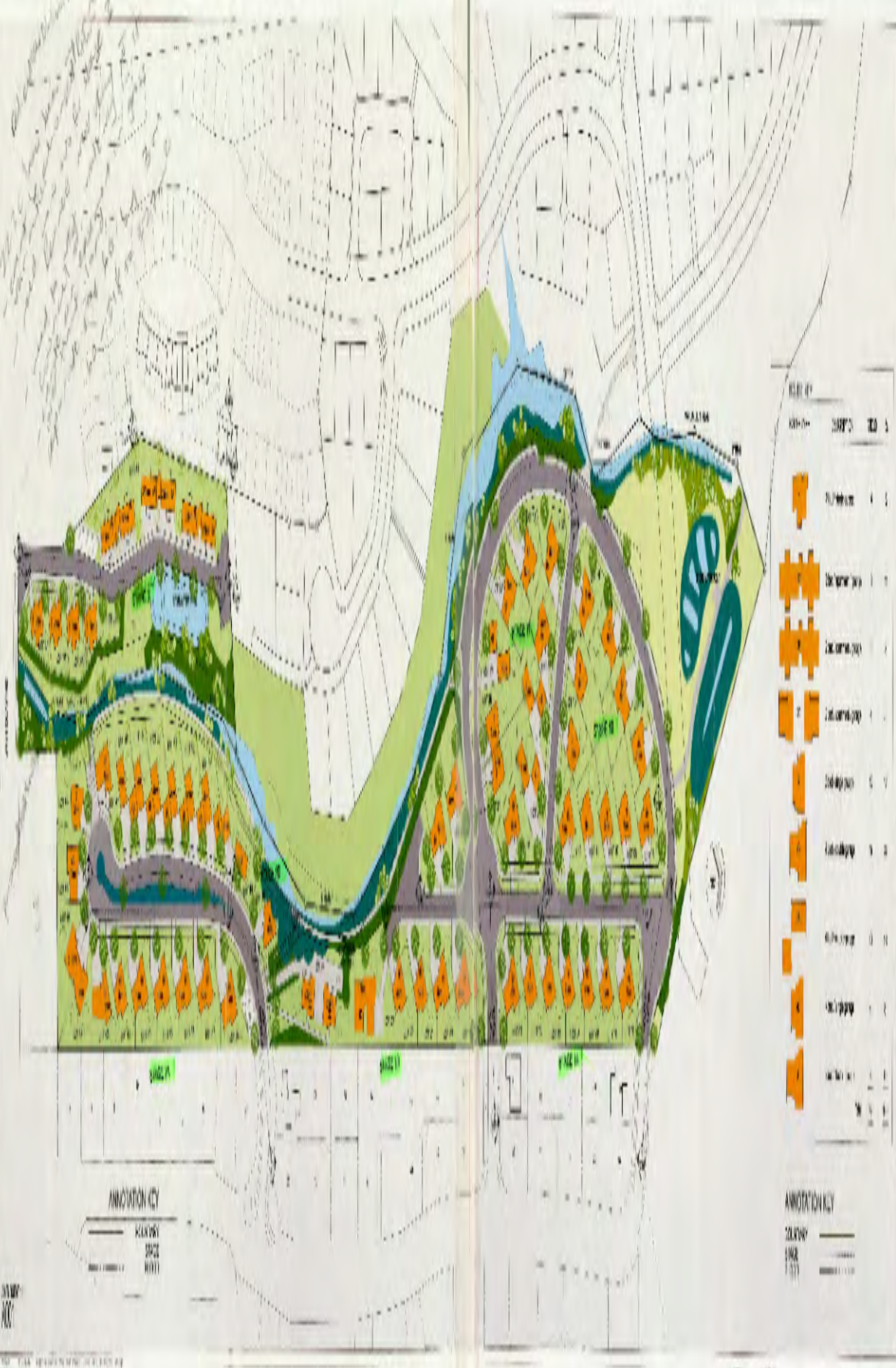
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	1st floor	1
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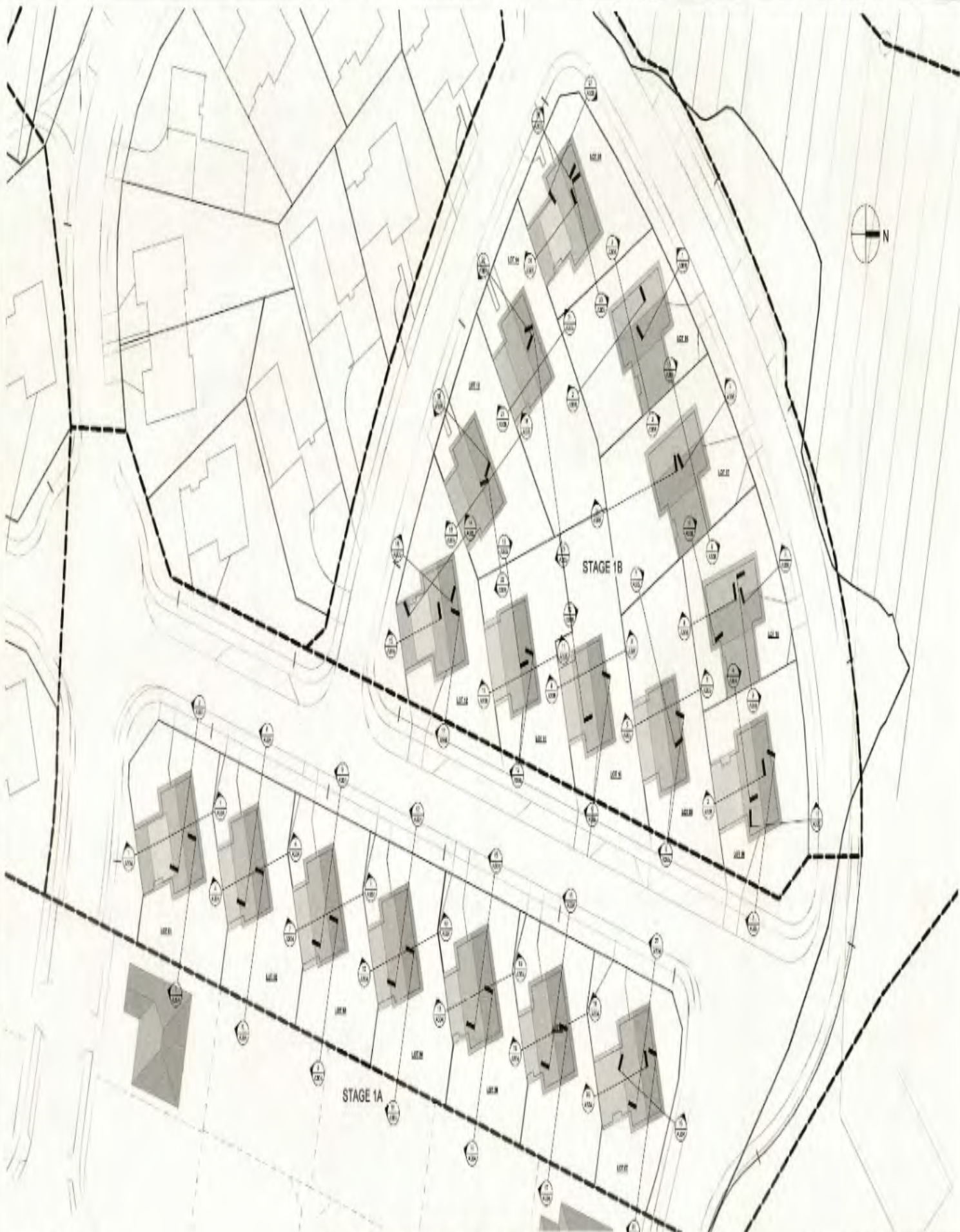
ANNOTATION KEY

- BOUNDARY
- STAGE
- FLOOD

WEST COAST RD  
 HOUSING DEVELOPMENT  
 PRELIMINARY LAYOUT STUDY

SITE PLAN





1 Site 1A  
A002 1 500

**Babbage**  
CONSULTANTS  
42608

**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

**SITE PLAN  
STAGE 1A &  
1B**  
REV A002



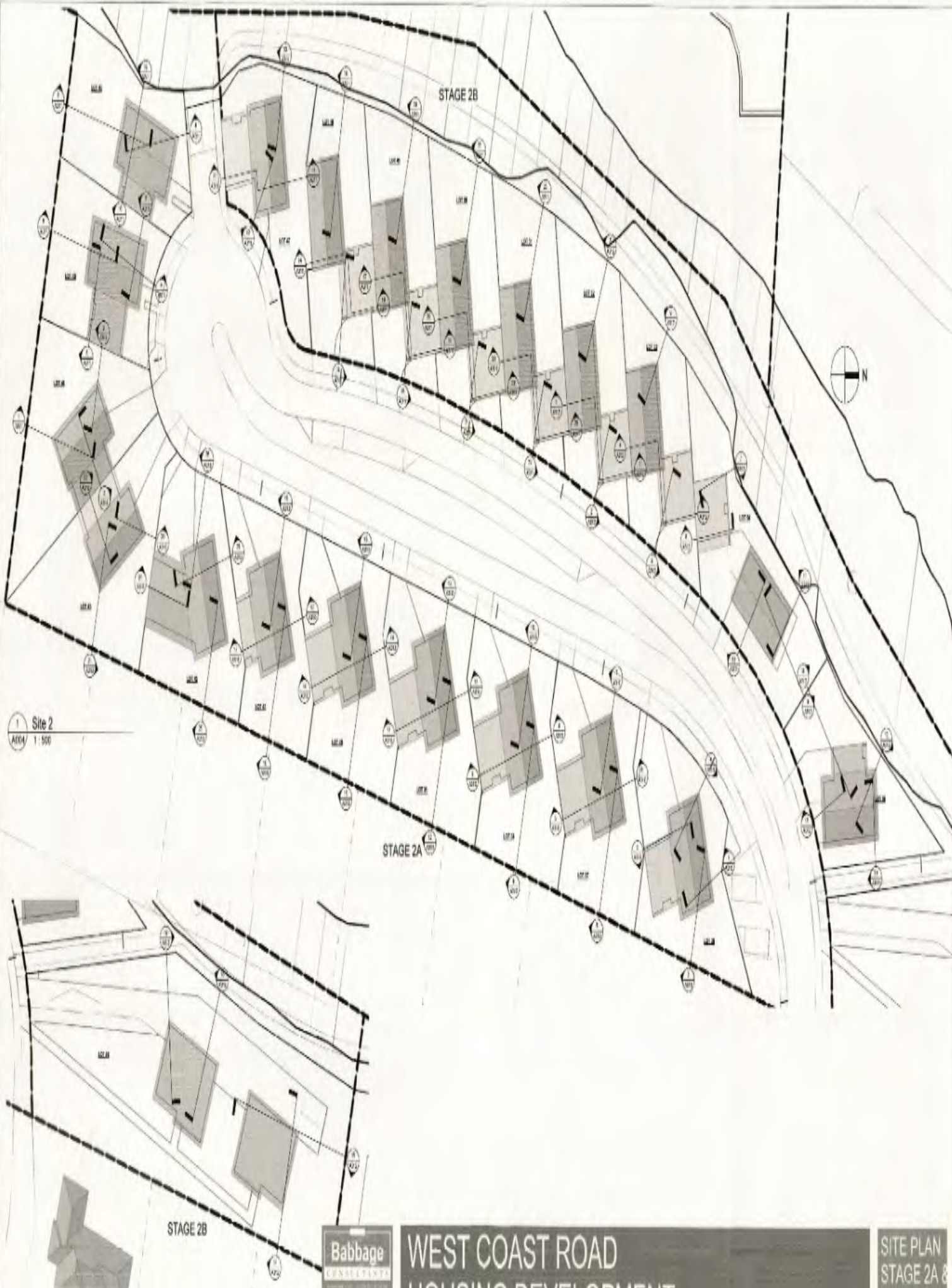
1 Site 1B  
A003 1:500

**Babbage**  
CONSULTANTS  
42608

# WEST COAST ROAD HOUSING DEVELOPMENT

BULK & LOCATION STUDY

SITE PLAN  
STAGE 1C &  
1D  
10 JUN 2008  
A003



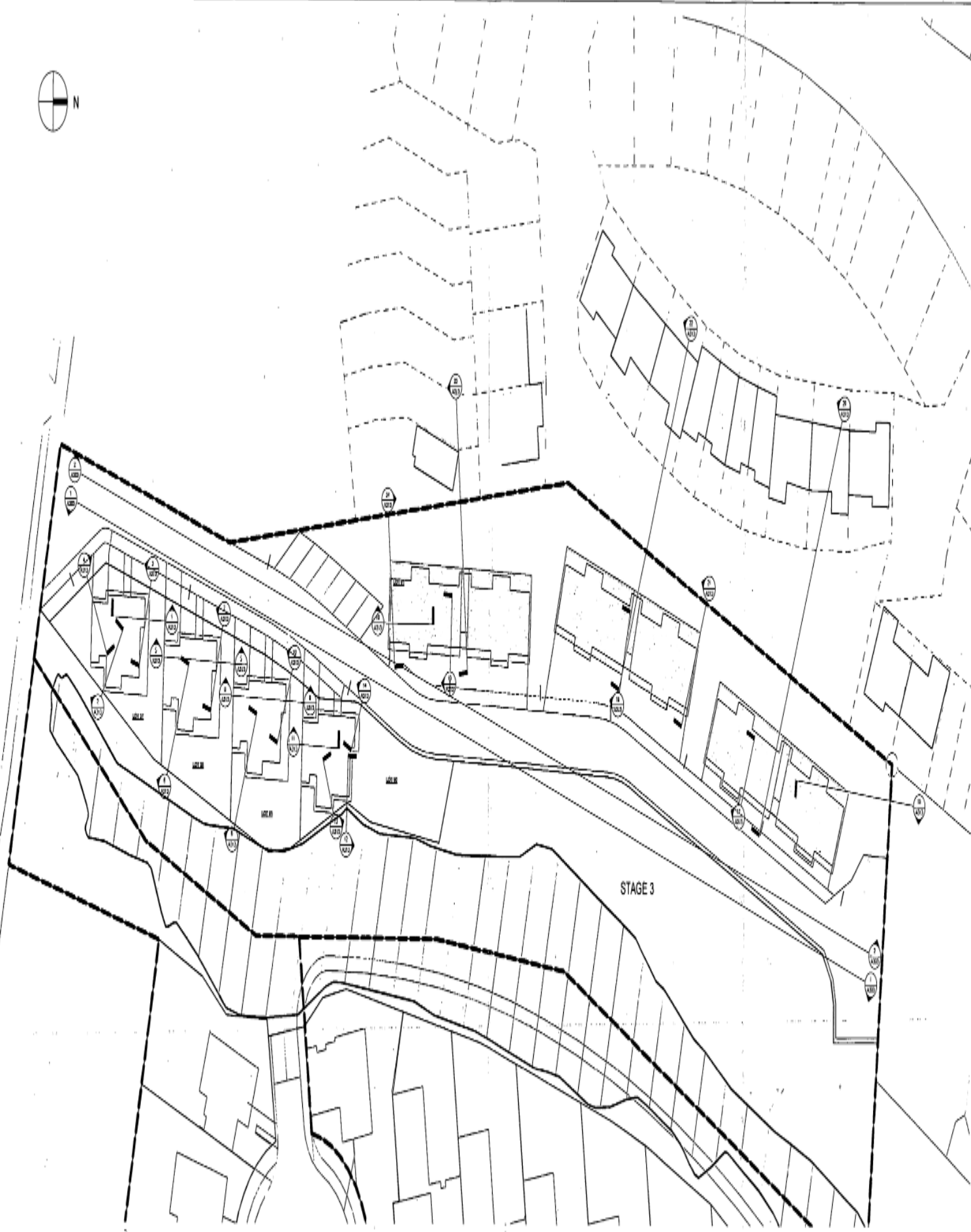
1 Site 2  
A004 1:500

2 Site 2 - Lot 56  
A004 1:500

**Babbage**  
CONSULTANTS  
42608

**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

**SITE PLAN  
STAGE 2A &  
2B**  
JEROME  
A004



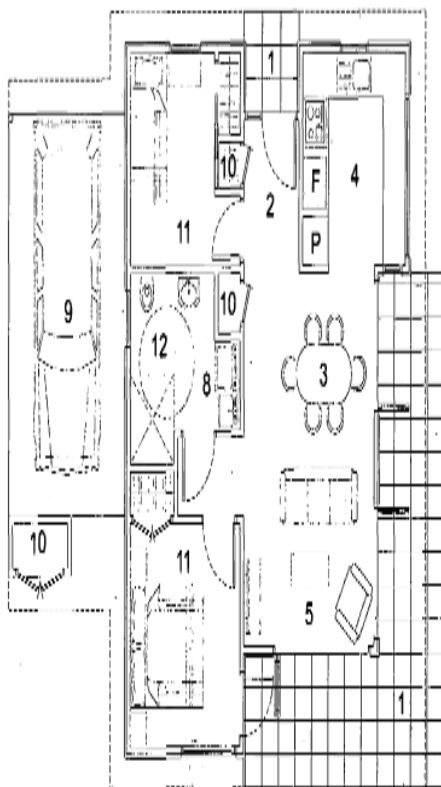
1 Site 3  
A005 1:500



# WEST COAST ROAD HOUSING DEVELOPMENT

BULK & LOCATION STUDY

SITE PLAN  
STAGE 3  
A005



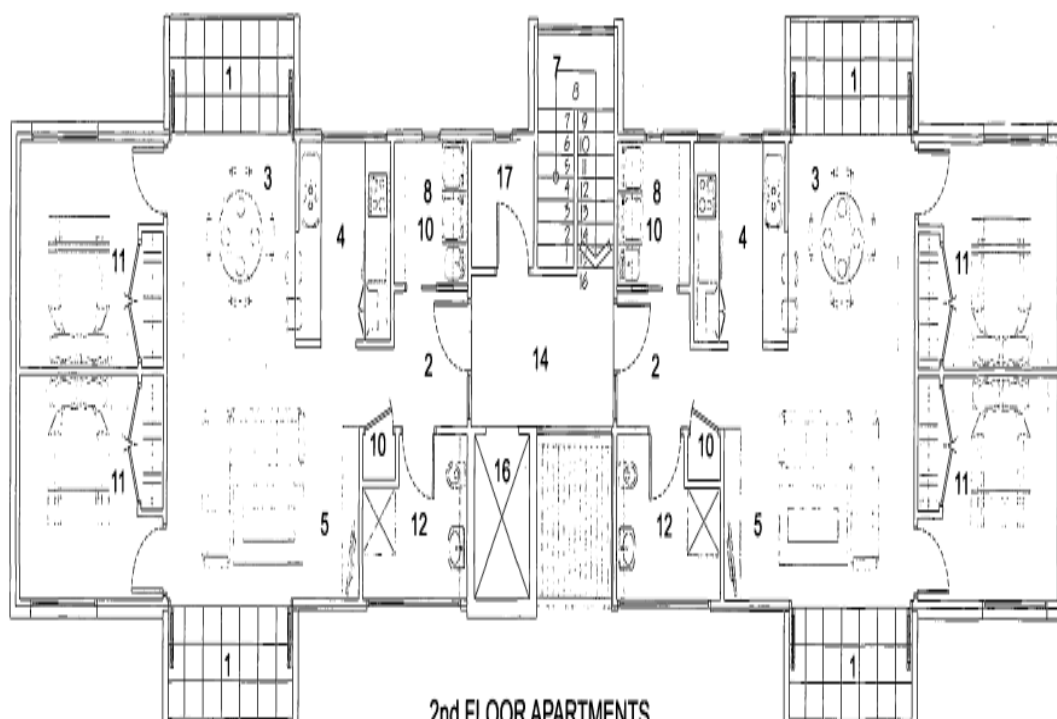
GROUND FLOOR PLAN



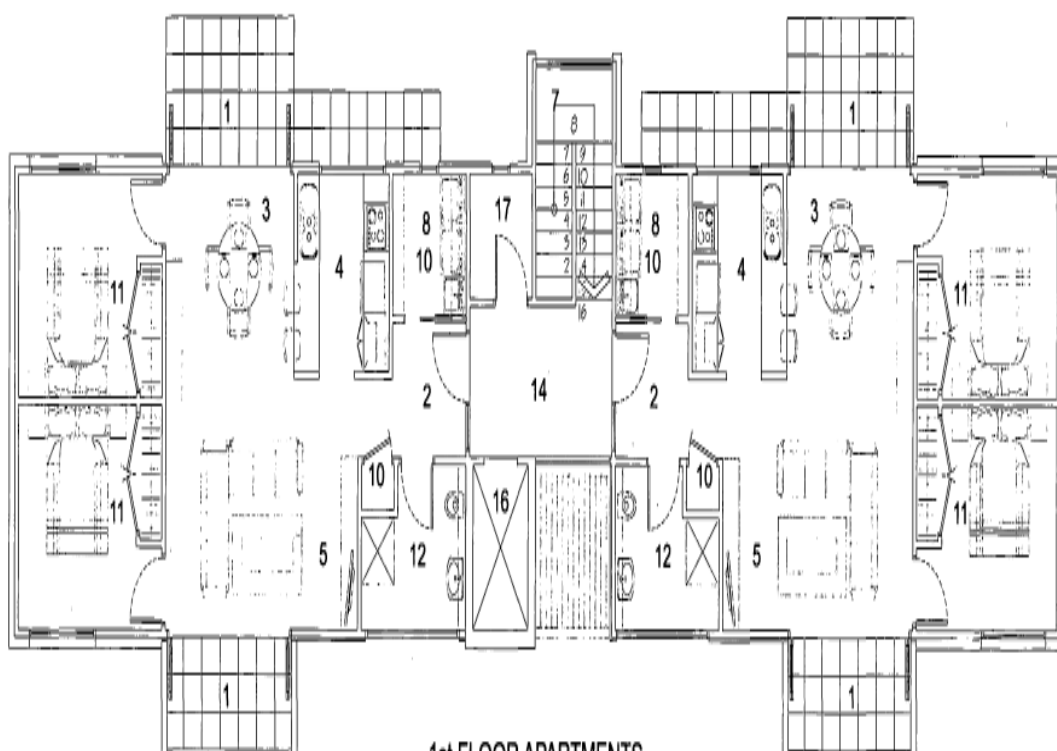
ROOF PLAN

# PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



2nd FLOOR APARTMENTS

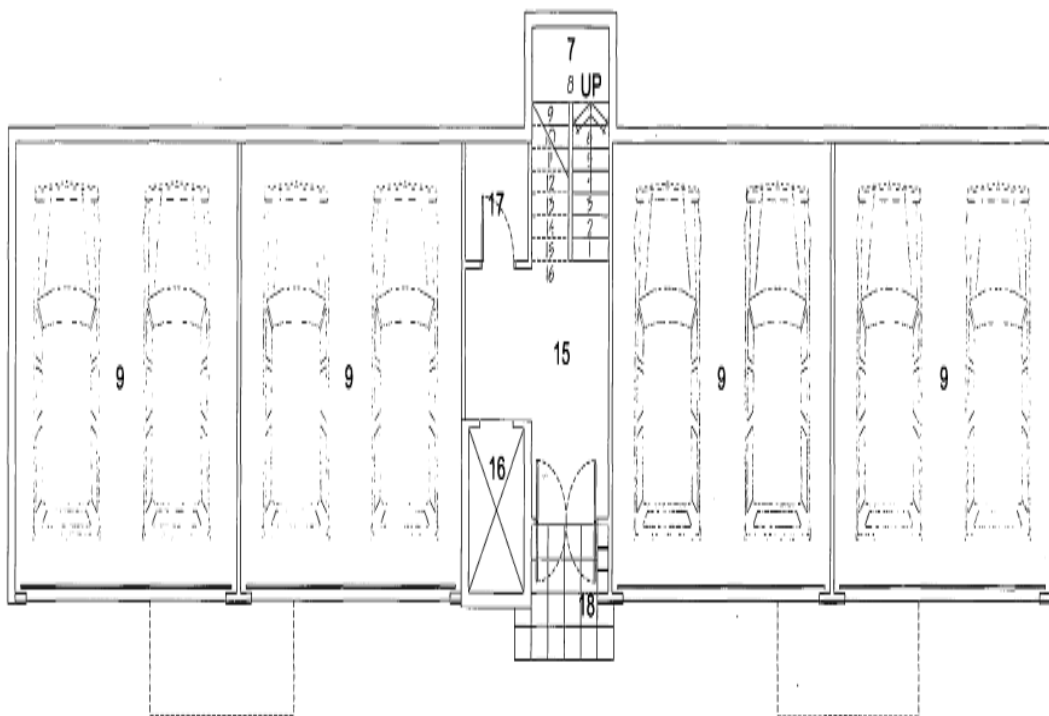


1st FLOOR APARTMENTS



# PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry / Utility
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway
- 15 Common entry lobby
- 16 Lift
- 17 Services cupboard
- 18 Mail boxes / Intercom

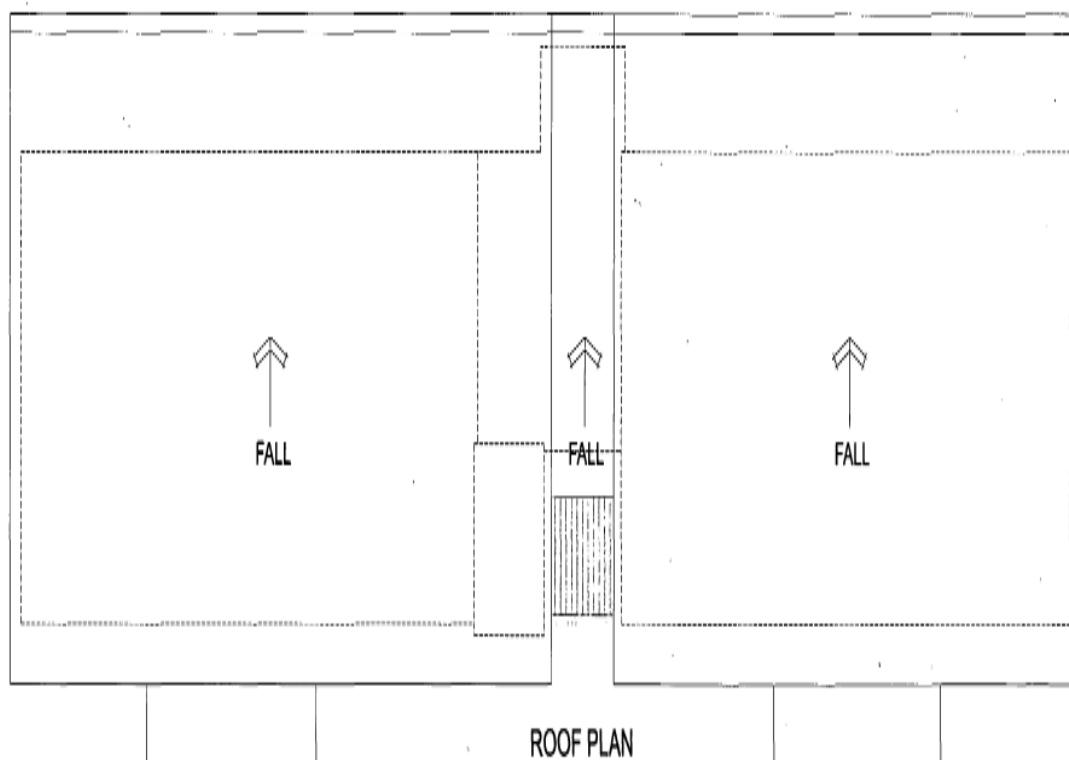


GROUND FLOOR CARPARKING



# PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry / Utility
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway
- 15 Common entry lobby
- 16 Lift
- 17 Services cupboard
- 18 Mail boxes / Intercom

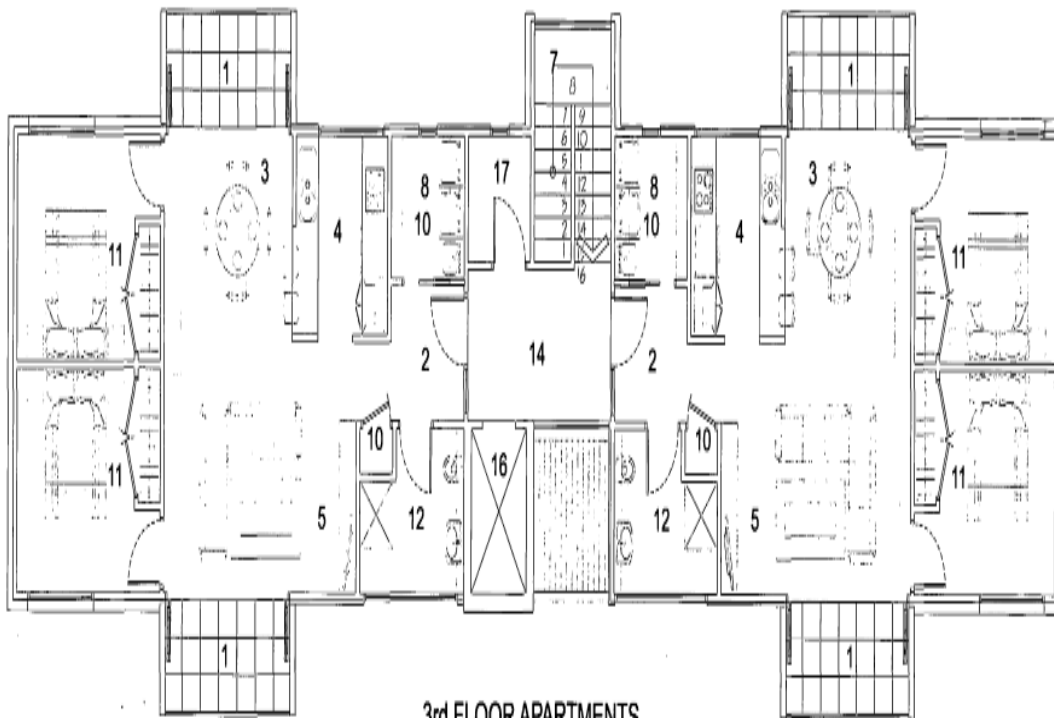


ROOF PLAN



## WEST COAST RD HOUSING DEVELOPMENT TYPE 2A HOUSE - 2 BEDROOM APARTMENT / DOUBLE GARAGE



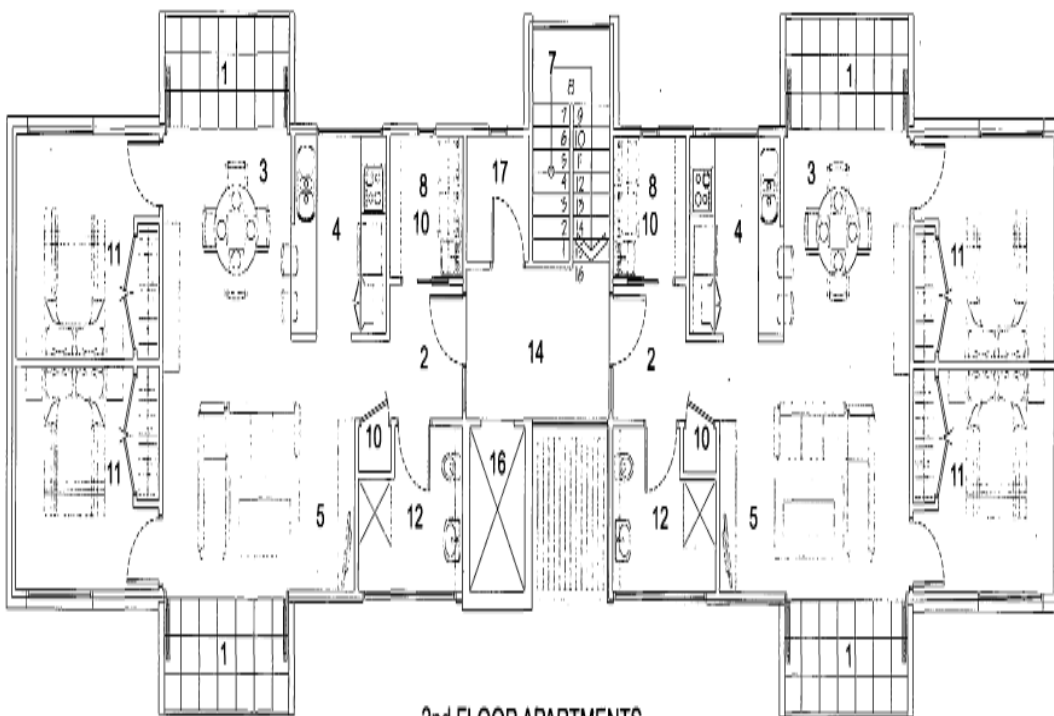


3rd FLOOR APARTMENTS

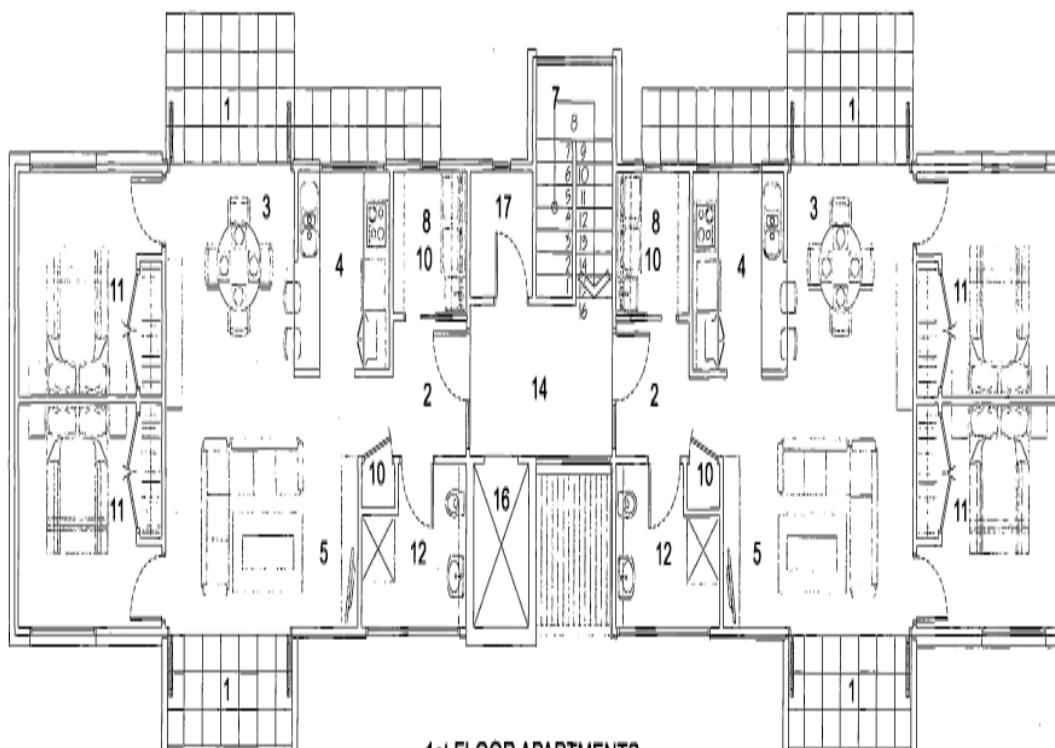


PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry / Utility
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway
- 15 Common entry lobby
- 16 Lift
- 17 Services cupboard
- 18 Mail boxes / Intercom



2nd FLOOR APARTMENTS



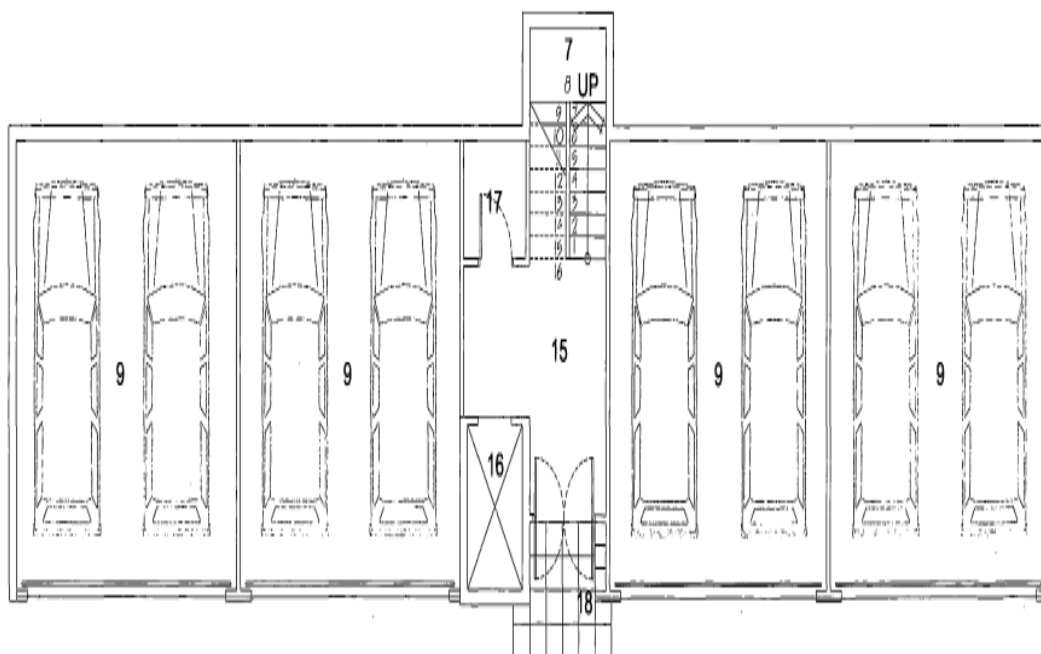
1st FLOOR APARTMENTS

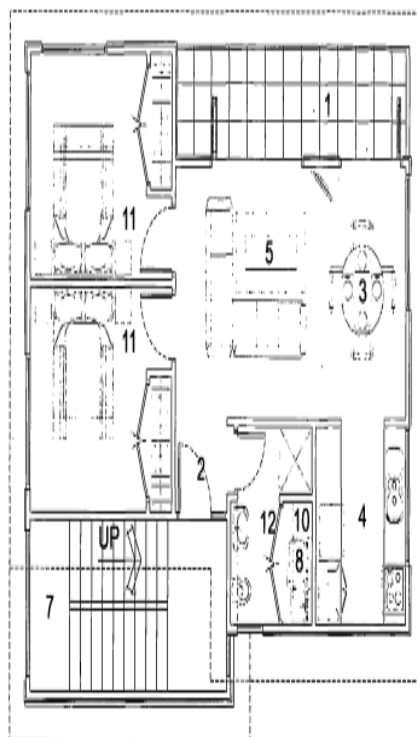
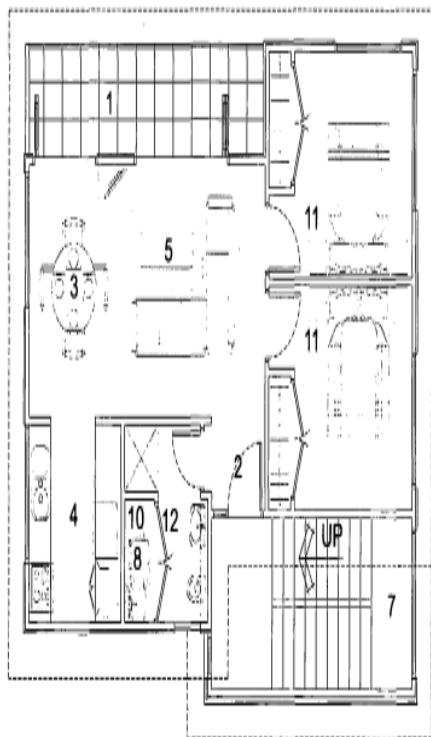


PLAN KEY

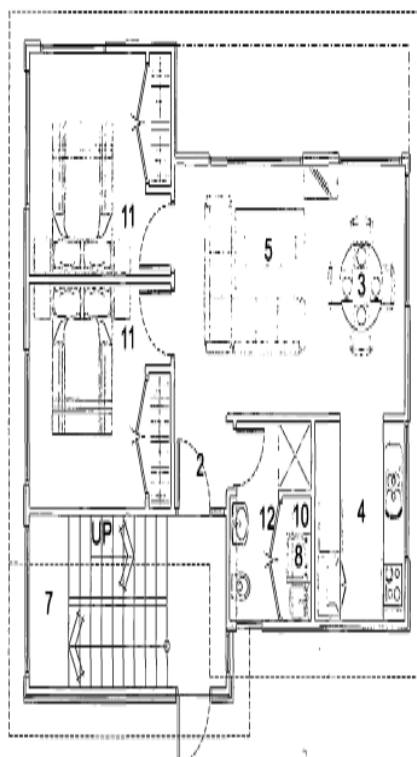
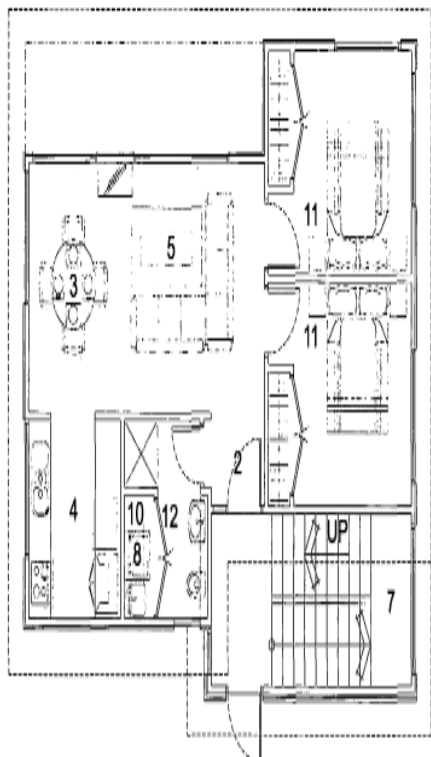
- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry / Utility
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway
- 15 Common entry lobby
- 16 Lift
- 17 Services cupboard
- 18 Mail boxes / Intercom

NOTE: ROOF PLAN SAME  
AS TYPE 2A APARTMENTS





1st FLOOR APARTMENT

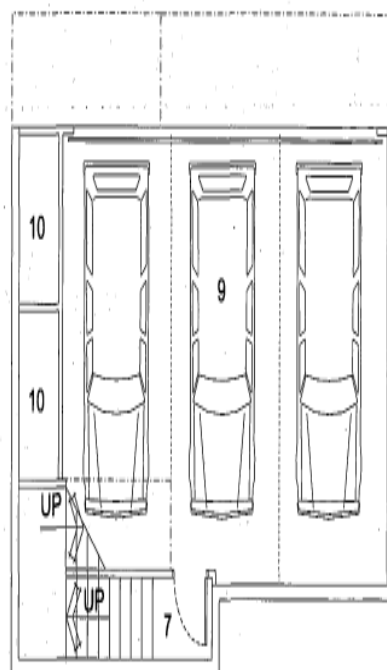
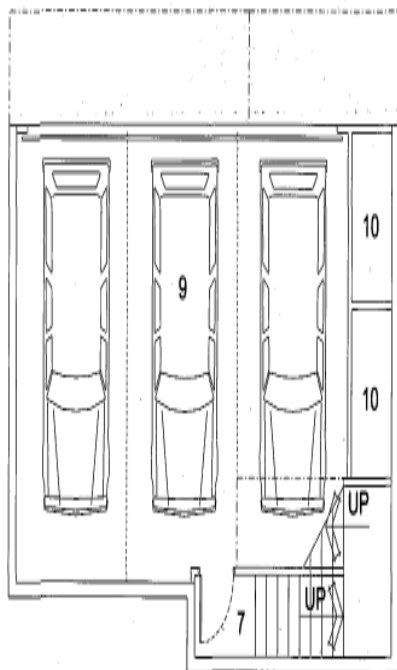


UPPER GROUND FLOOR APARTMENT



# PLAN KEY

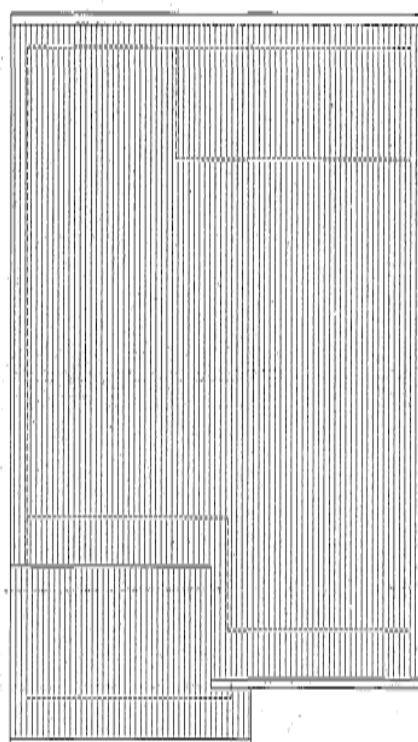
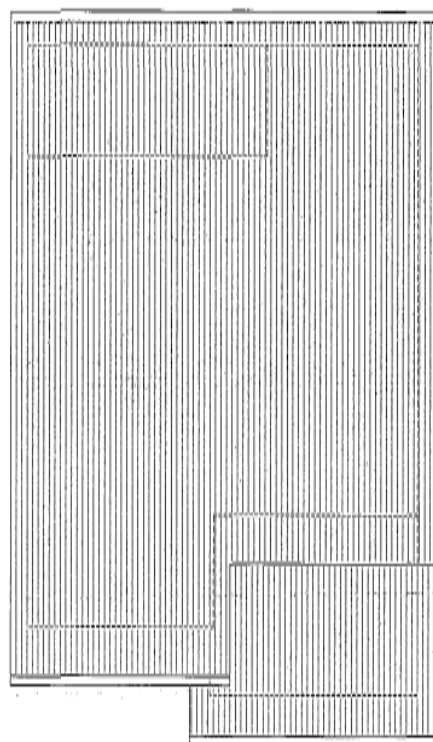
- 1 Covered Porch
- 2 Entry Hall
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- 8 Laundry / Utility
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# PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
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- 5 Living
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- 7 Stairs
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- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway
- 15 Common entry lobby
- 16 Lift
- 17 Services cupboard
- 18 Mail boxes / Intercom

LOWER GROUND FLOOR GARAGE



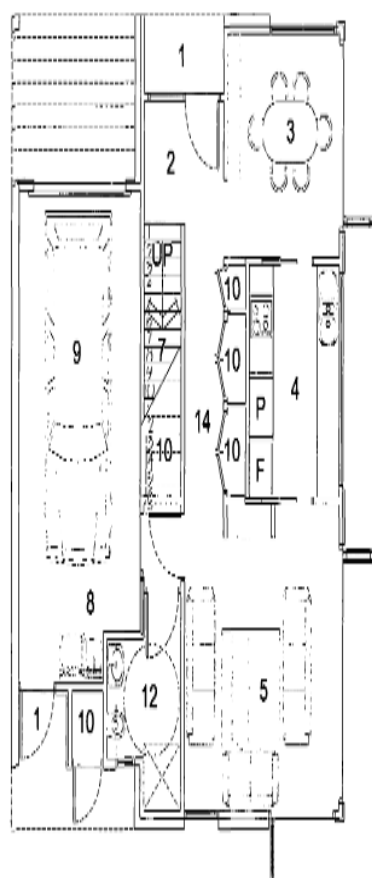
ROOF PLAN

(optimal orientation)

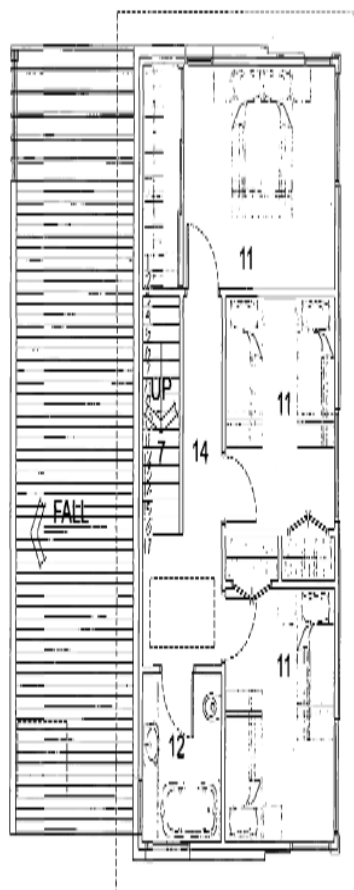


# PLAN KEY

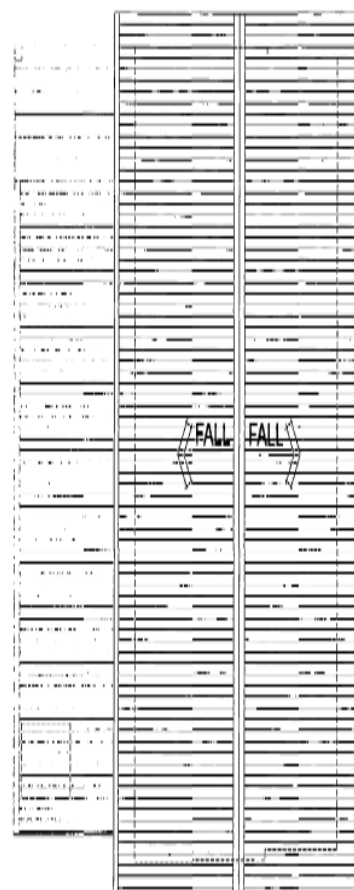
- 1 Covered Porch
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- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



GROUND FLOOR PLAN



UPPER FLOOR PLAN



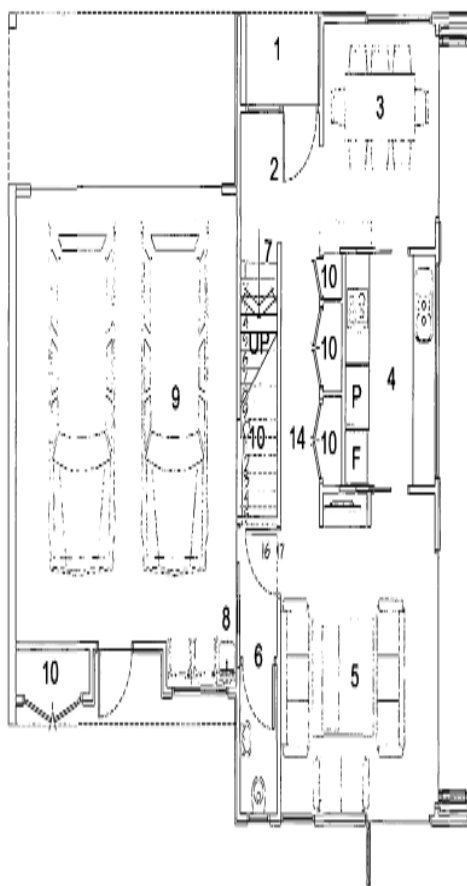
ROOF PLAN



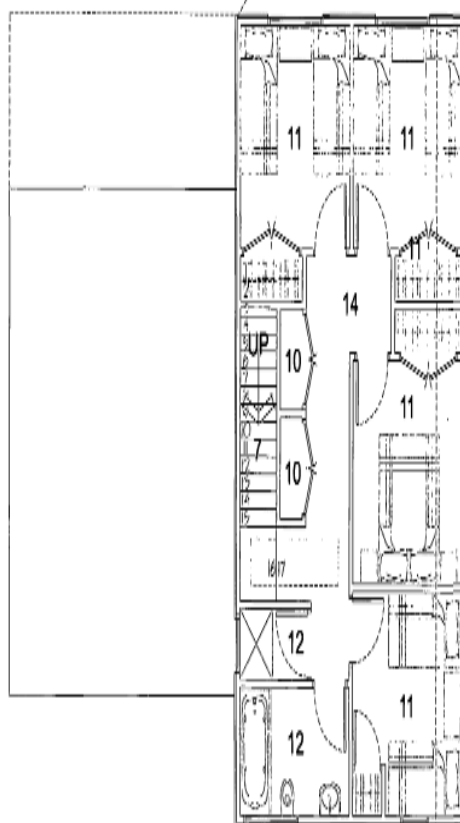
## WEST COAST RD HOUSING DEVELOPMENT

TYPE 3 HOUSE - 3 BEDROOM / SINGLE GARAGE

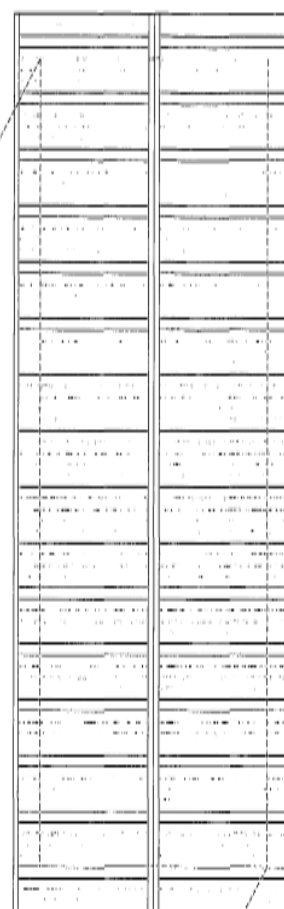




GROUND FLOOR PLAN



UPPER FLOOR PLAN



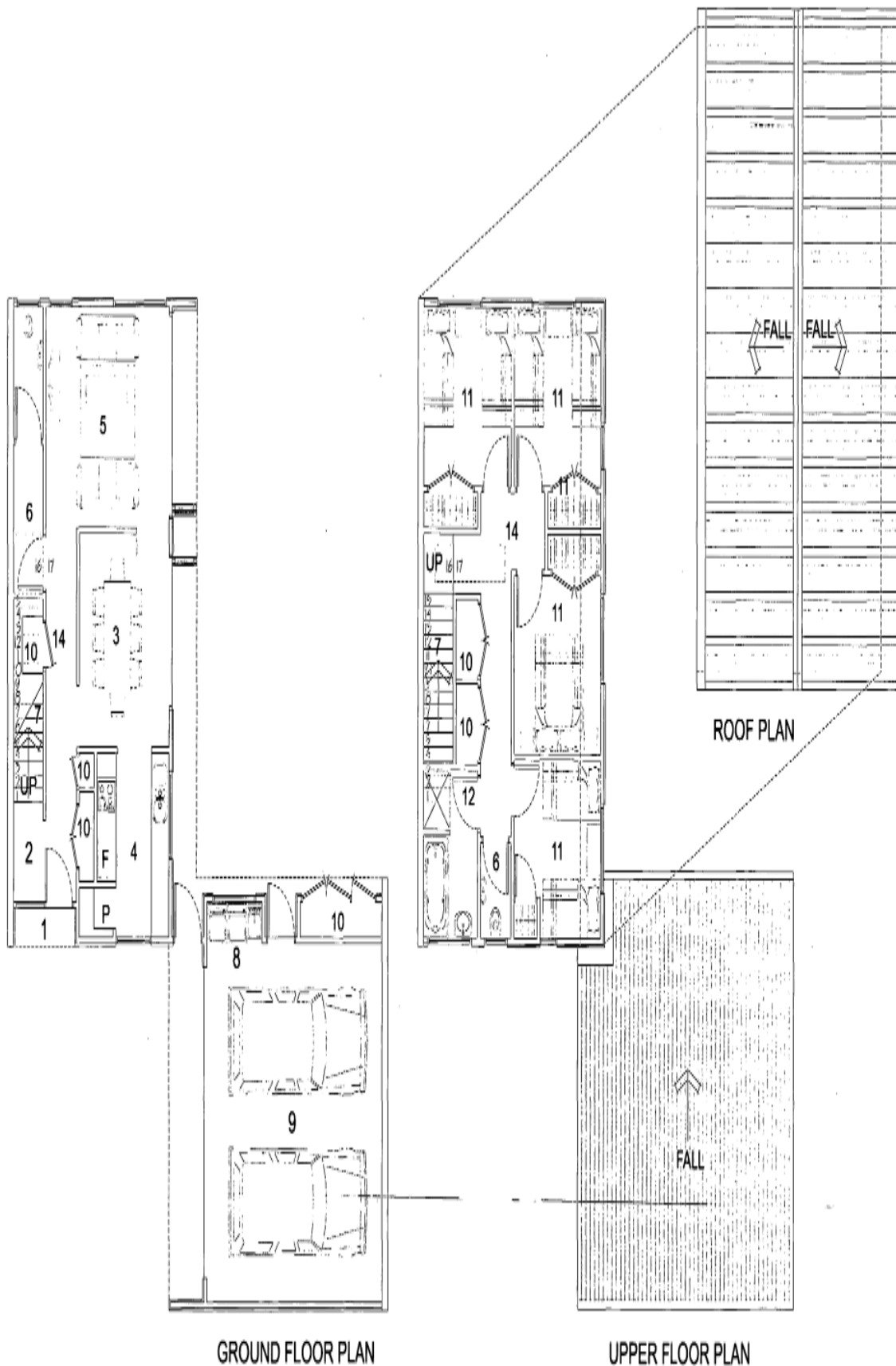
ROOF PLAN

(optimal orientation)



# PLAN KEY

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



# PLAN KEY

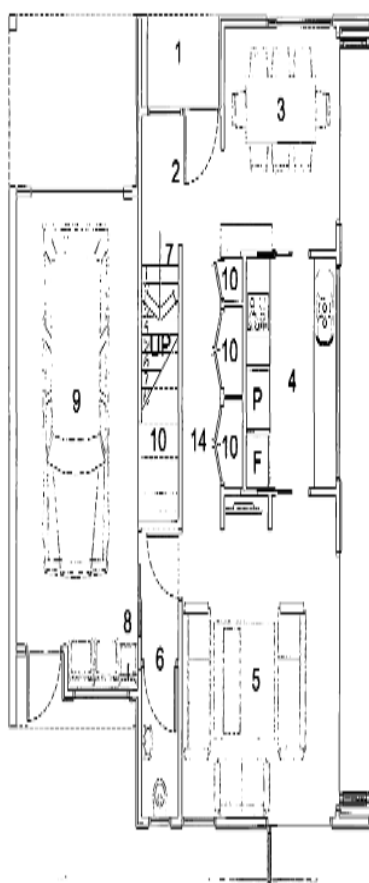
- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway

(optimal orientation)

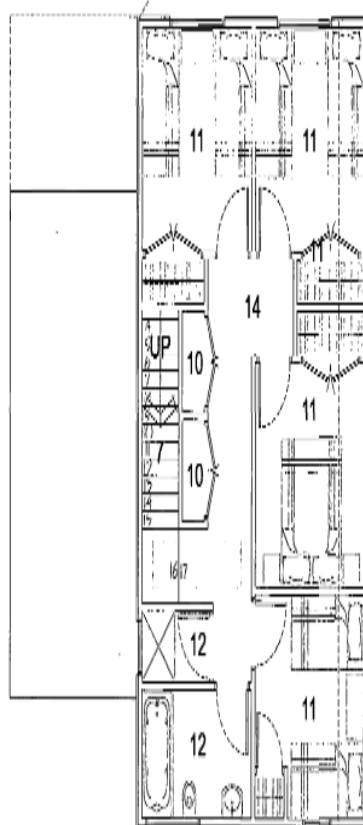


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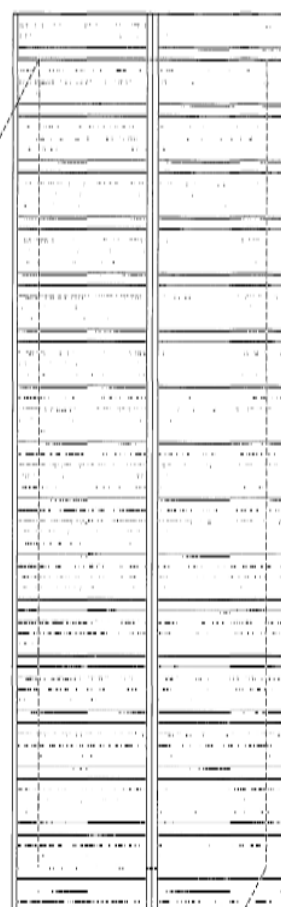
- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



GROUND FLOOR PLAN



UPPER FLOOR PLAN

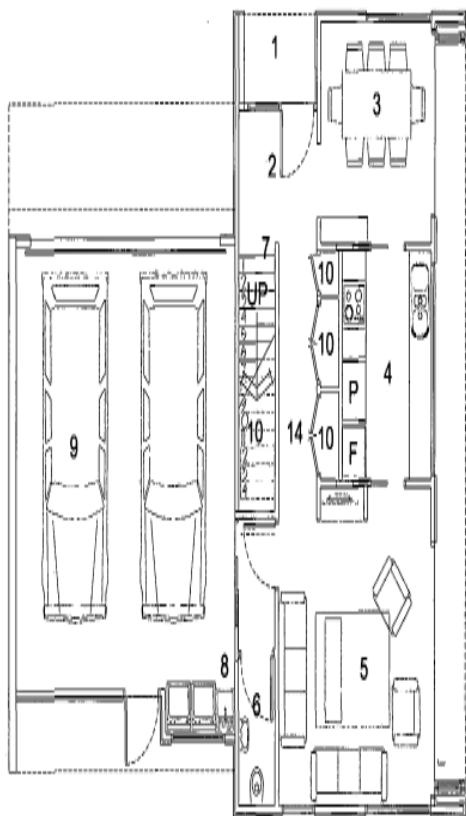


ROOF PLAN

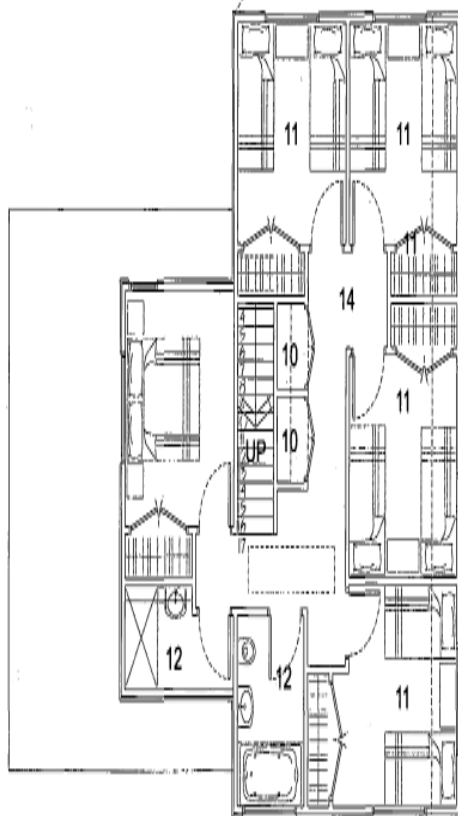


## WEST COAST RD HOUSING DEVELOPMENT TYPE 4C HOUSE - 4 BEDROOM / SINGLE GARAGE

FLOOR PLAN  
 scale 1:100  
 DATE 1/10/2006  
 A108



GROUND FLOOR PLAN



UPPER FLOOR PLAN

1	Covered Porch
2	Entry Hall
3	Dining
4	Kitchen
5	Living
6	WC
7	Stairs
8	Laundry
9	Garage
10	Storage
11	Bedroom
12	Bathroom
13	Ensuite
14	Hallway

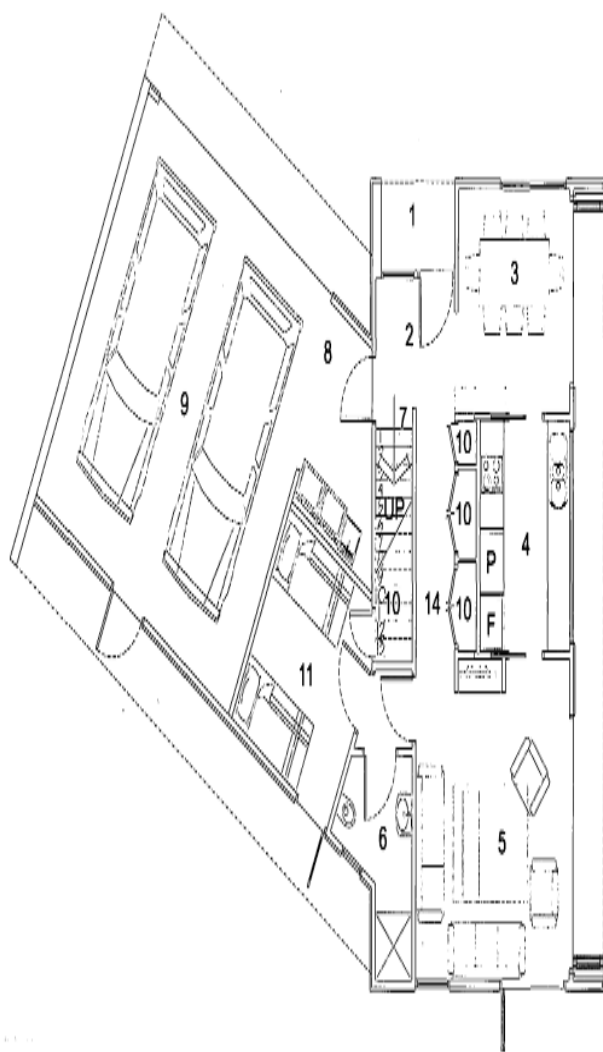
ROOF PLAN

(optimal orientation)

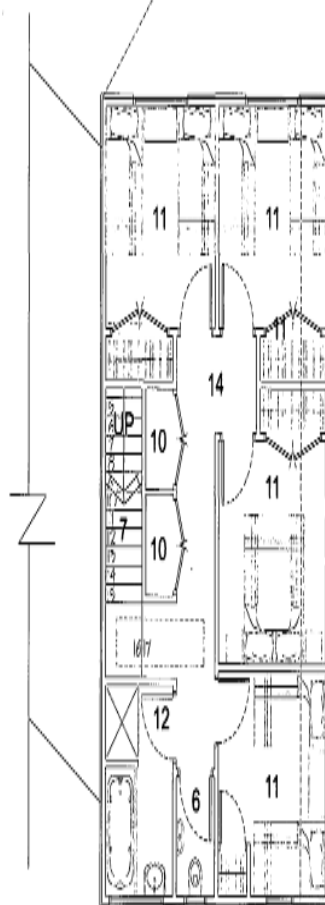


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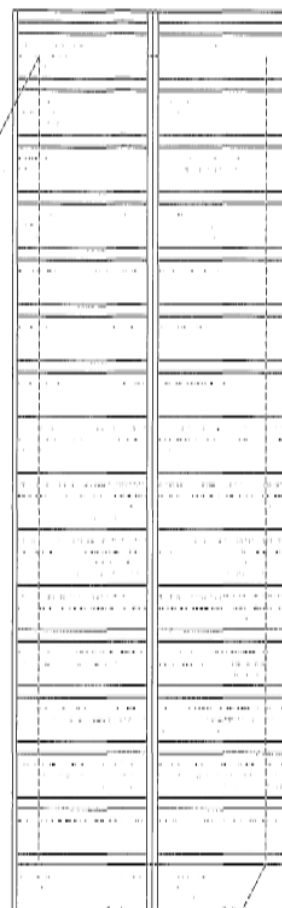
- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



GROUND FLOOR PLAN



UPPER FLOOR PLAN



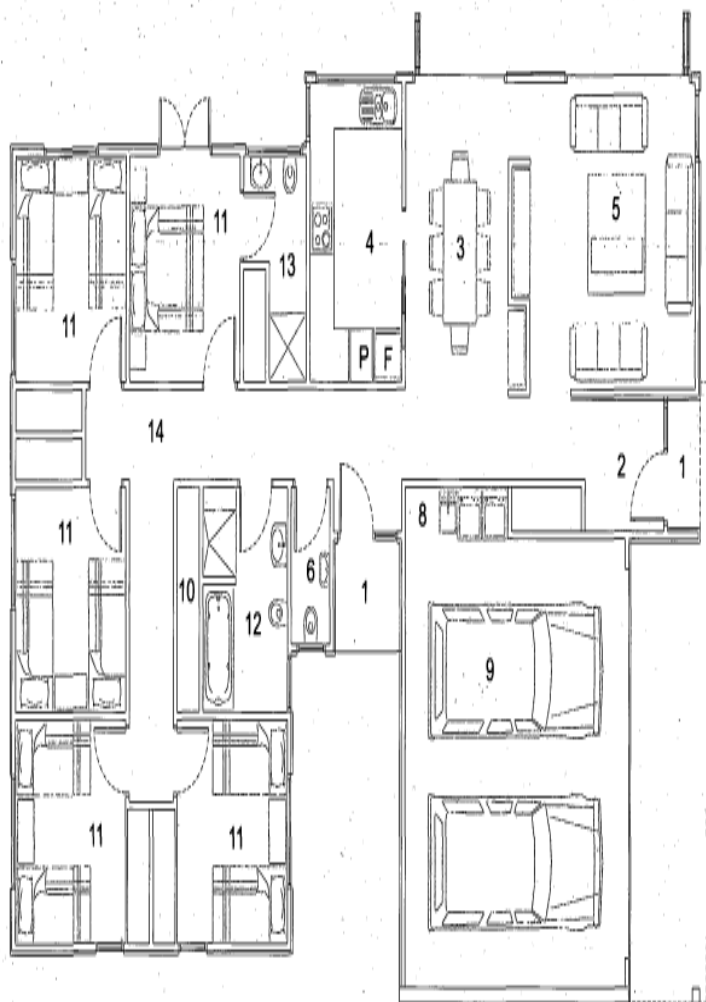
ROOF PLAN

(optimal orientation)



# PLAN KEY

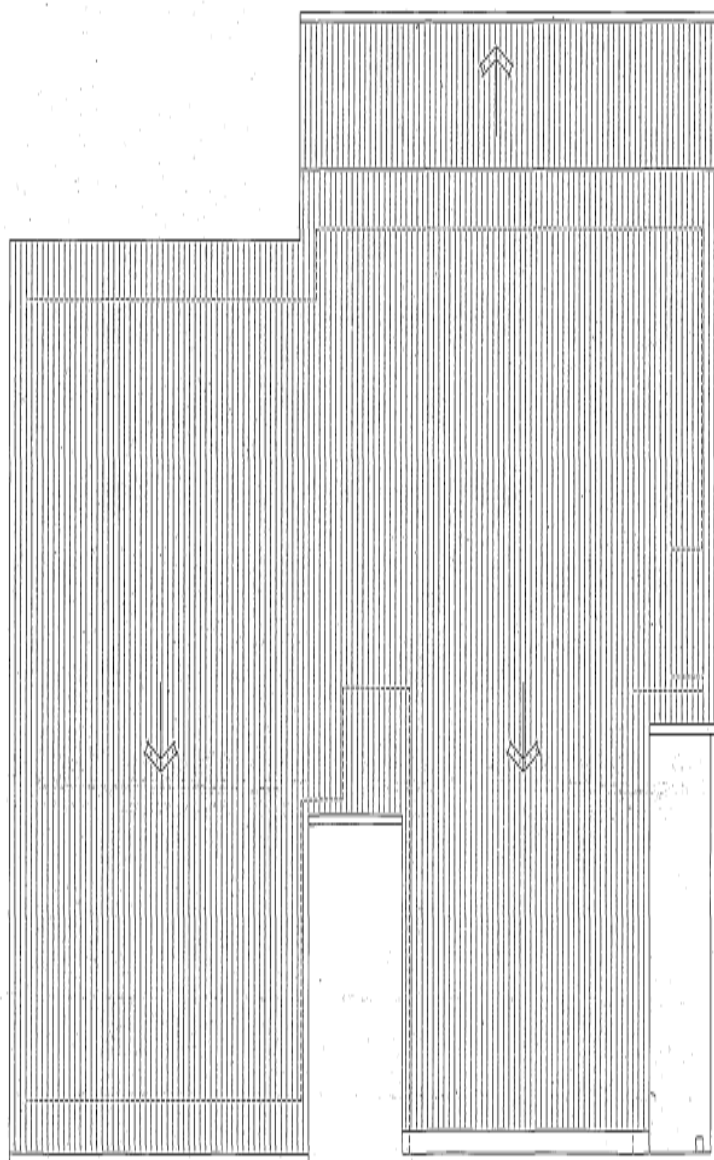
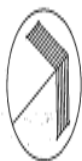
- 1 Covered Porch
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- 9 Garage
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- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway



# PLAN KEY

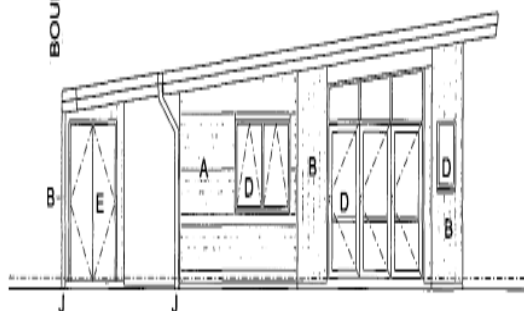
## FLOOR PLAN

- 1 Covered Porch
- 2 Entry Hall
- 3 Dining
- 4 Kitchen
- 5 Living
- 6 WC
- 7 Stairs
- 8 Laundry
- 9 Garage
- 10 Storage
- 11 Bedroom
- 12 Bathroom
- 13 Ensuite
- 14 Hallway

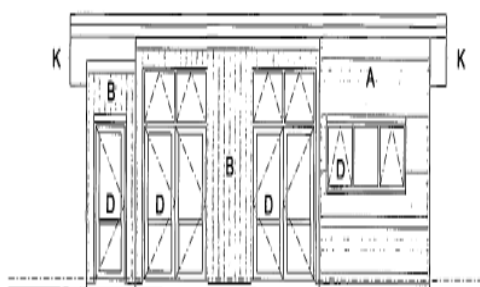


## ROOF PLAN

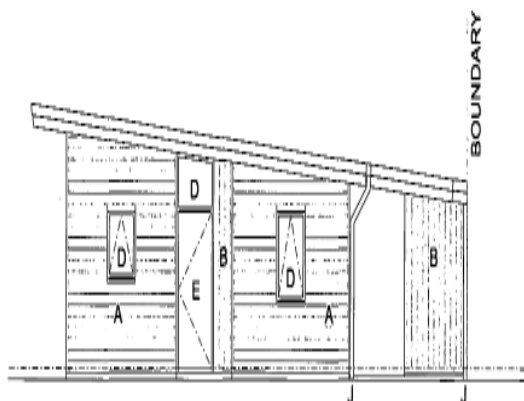
BOUNDARY



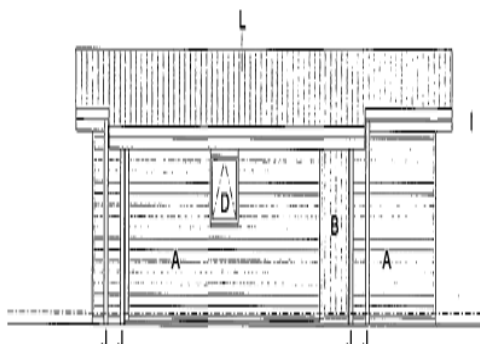
EAST ELEVATION



NORTH ELEVATION



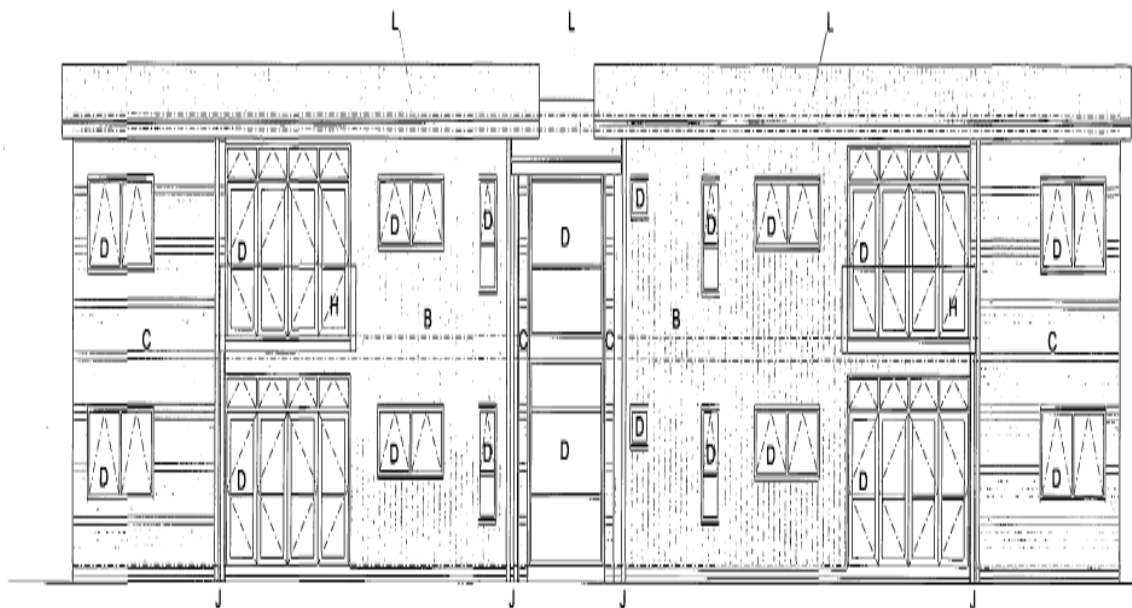
WEST ELEVATION



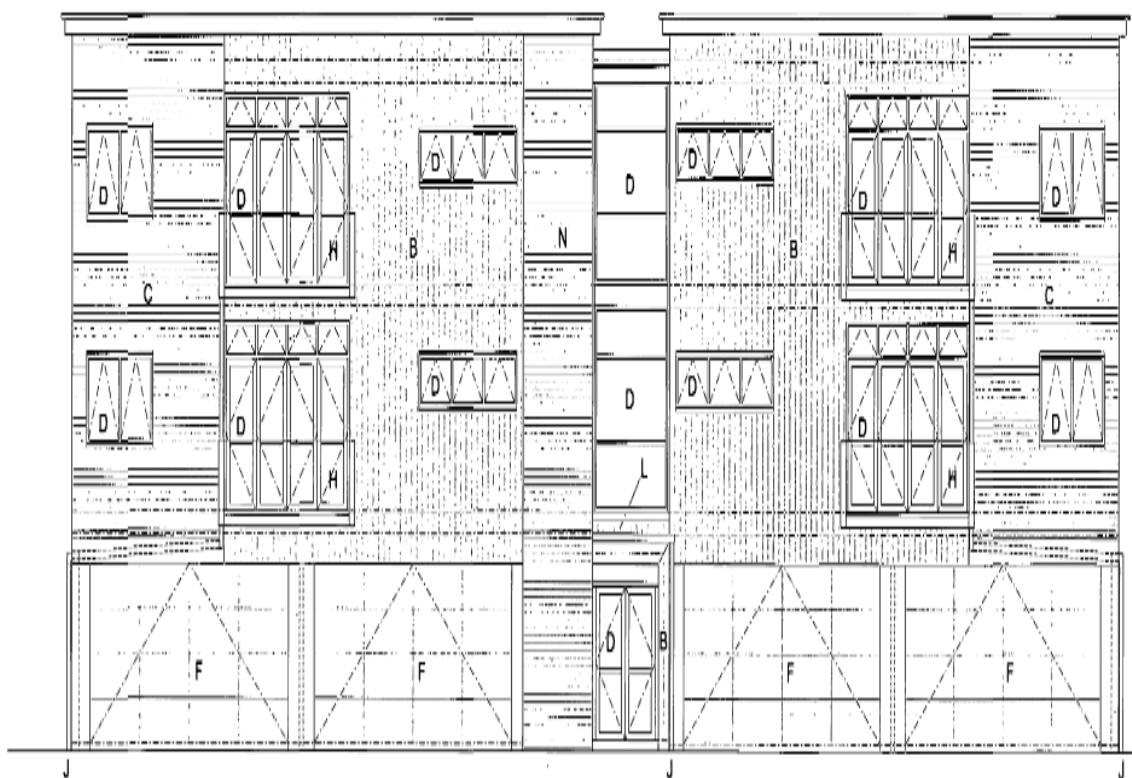
SOUTH ELEVATION

## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
- B Timber weatherboards on batten & cavity. Rusticated detail, laid vertically. Paint finish.
- C Architectural masonry veneer.
- D Powder coated aluminium window joinery.
- E Solid core exterior door in aluminium frame. Paint finish.
- F Timber sectional overhead garage door. Paint finish.
- G Galvanised and powder coated balustrades/handrails. Pressed flashings to suit.
- H Glazed-front balconies. Powder coated aluminium fixings.
- I Colorsteel gutter and fascia
- J UPVC down pipe. Paint finish
- K Fibre cement panel soffit. Paint finish.
- L Longrun colorsteel roof, corrugate profile
- M Optional timber pergola. Paint finish.
- N Solid masonry wall.



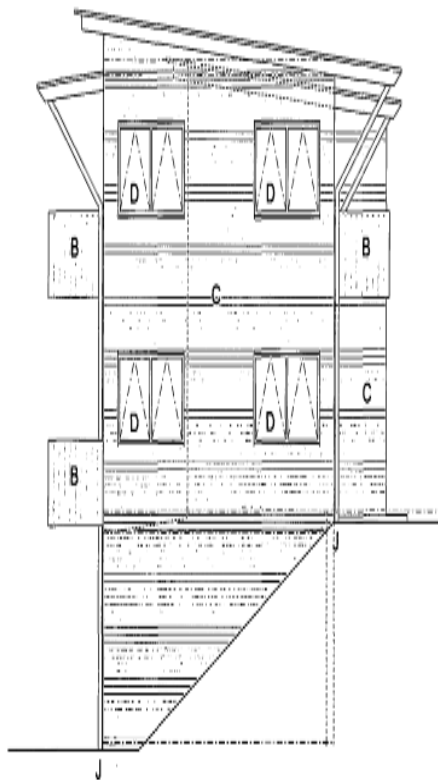
WEST ELEVATION



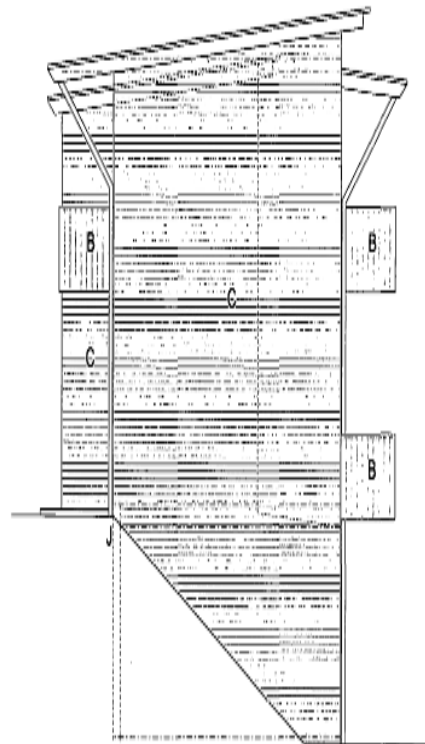
EAST ELEVATION

## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
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- I Colorsteel gutter and fascia
- J UPVC down pipe. Paint finish
- K Fibre cement panel soffit. Paint finish.
- L Longrun colorsteel roof, corrugate profile
- M Optional timber pergola. Paint finish.
- N Solid masonry wall.



NORTH ELEVATION



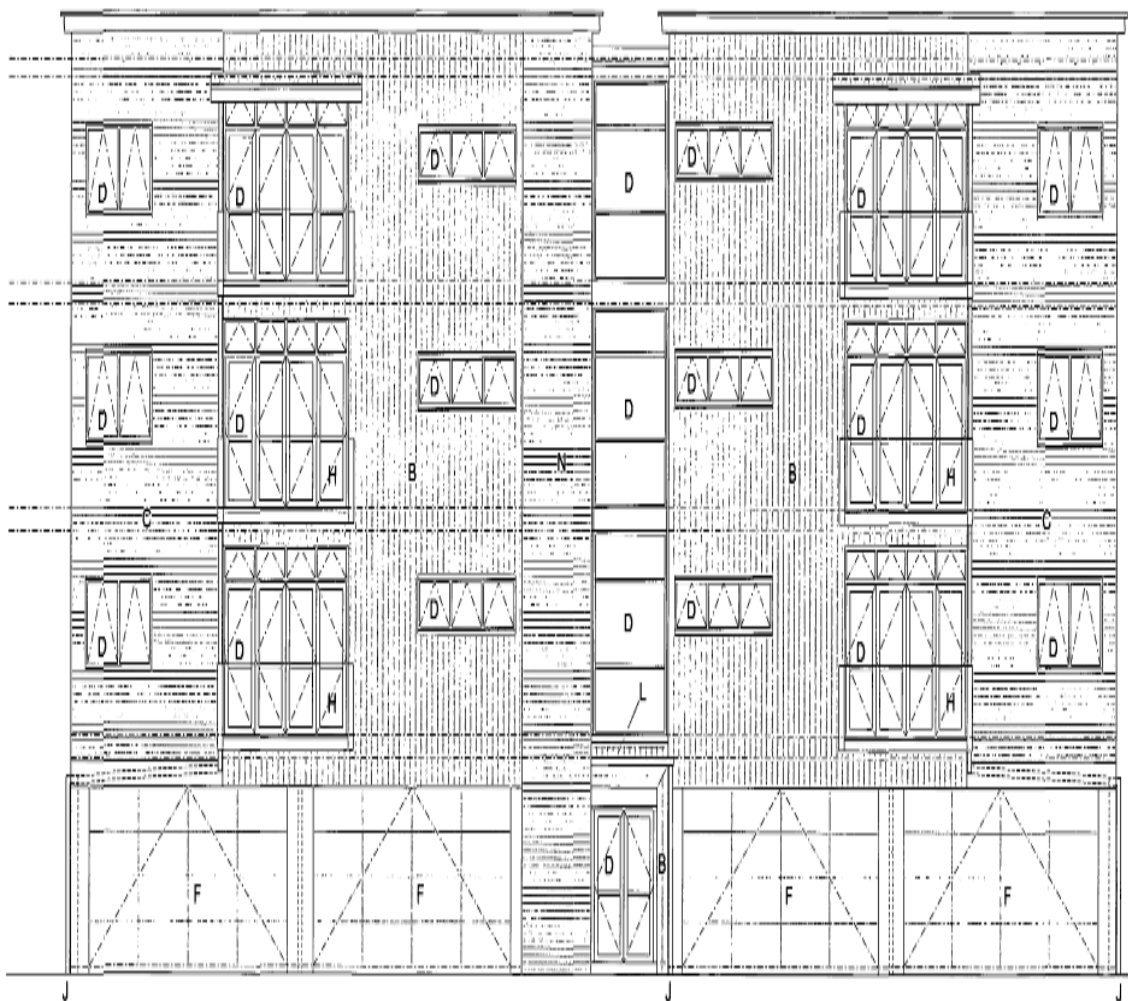
SOUTH ELEVATION

## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
- B Timber weatherboards on batten & cavity. Rusticated detail, laid vertically. Paint finish.
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## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
- B Timber weatherboards on batten & cavity. Rusticated detail, laid vertically. Paint finish.
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- K Fibre cement panel soffit. Paint finish.
- L Longrun colorsteel roof, corrugate profile
- M Optional timber pergola. Paint finish.
- N Solid masonry wall.

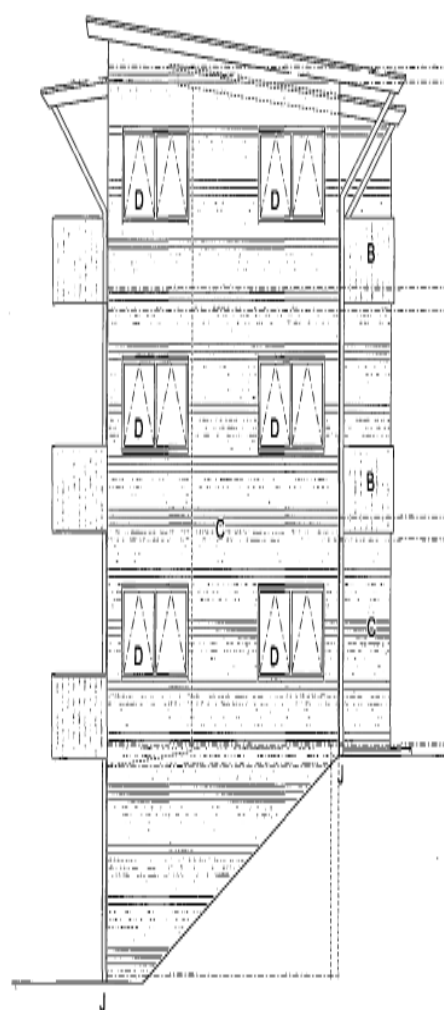


EAST ELEVATION

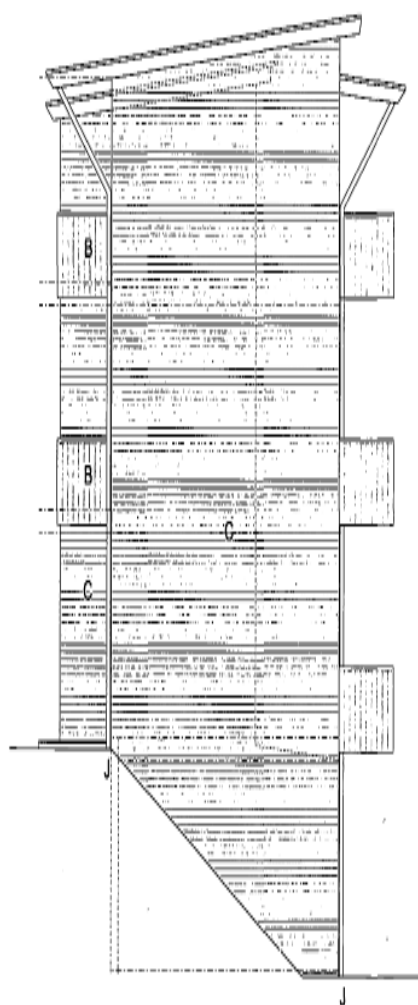
## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
- B Timber weatherboards on batten & cavity. Rusticated detail, laid vertically. Paint finish.
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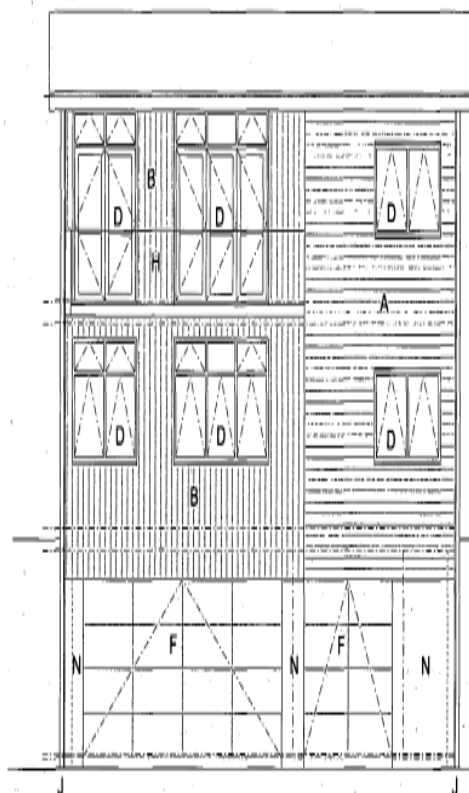
NORTH ELEVATION



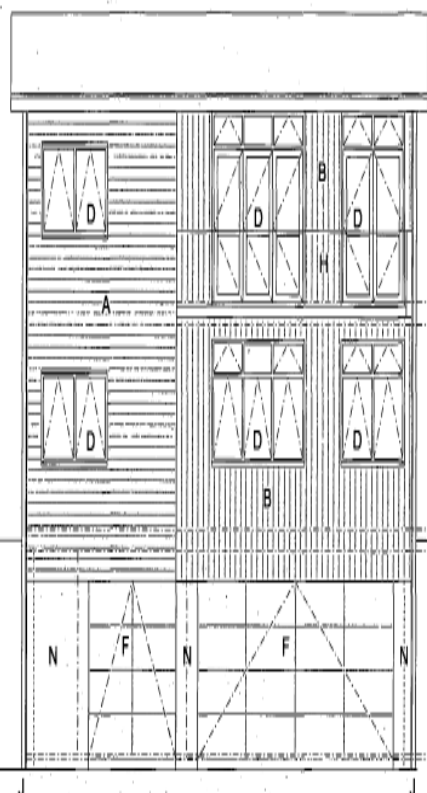
SOUTH ELEVATION

## ELEVATION KEY

- A Timber weatherboards on batten & cavity. Shiplap detail, laid horizontally. Paint finish.
- B Timber weatherboards on batten & cavity. Rusticated detail, laid vertically. Paint finish.
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- K Fibre cement panel soffit. Paint finish.
- L Longrun colorsteel roof, corrugate profile
- M Optional timber pergola. Paint finish.
- N Solid masonry wall.

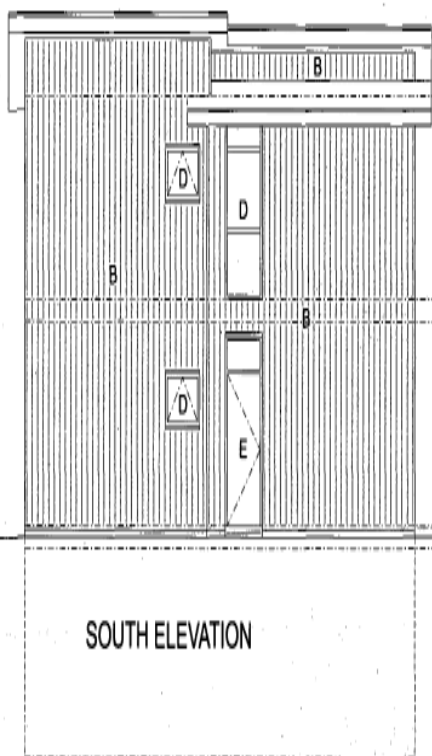


NORTH ELEVATION

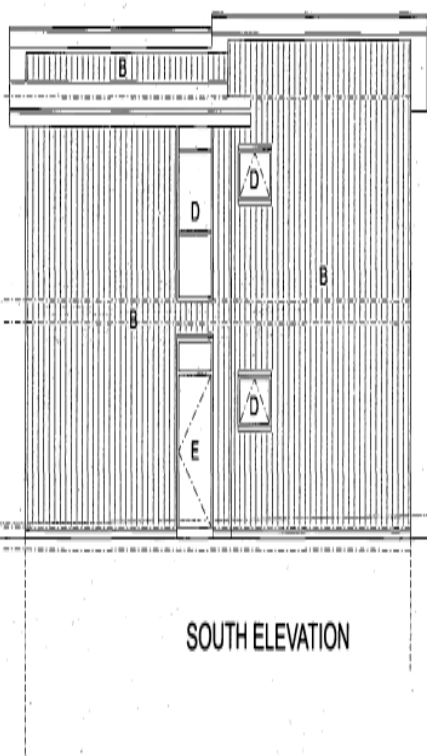


## ELEVATION KEY

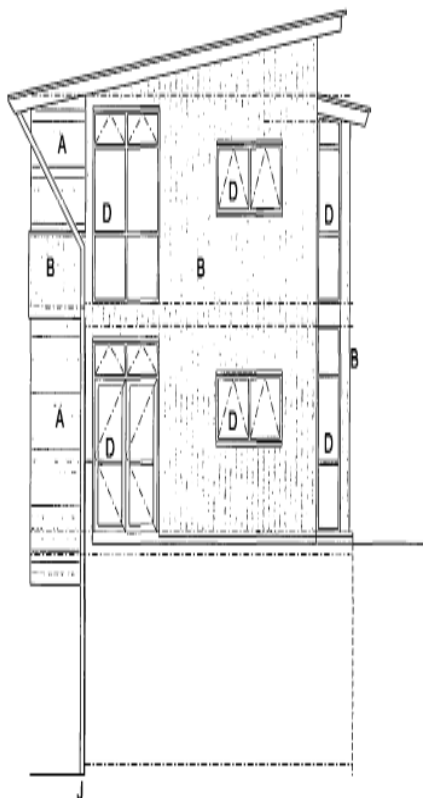
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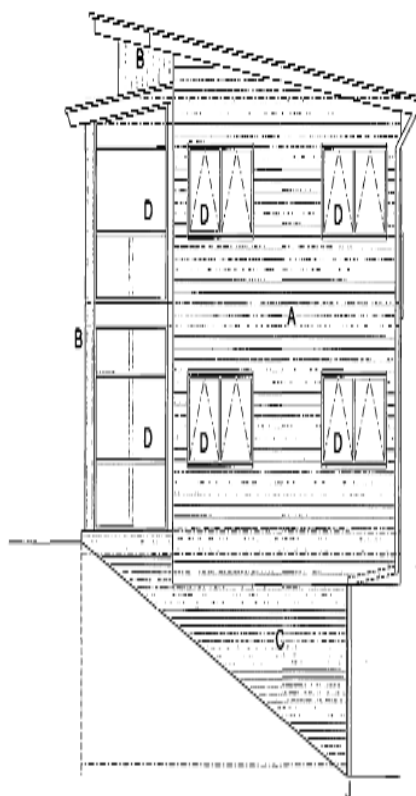
SOUTH ELEVATION



SOUTH ELEVATION



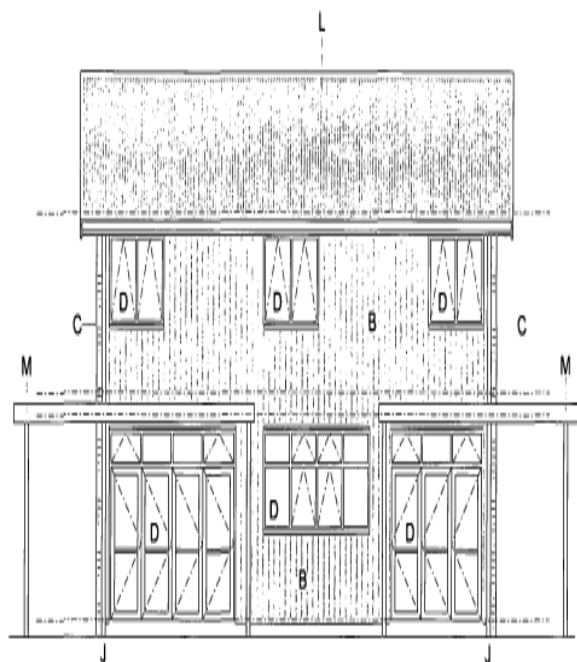
WEST ELEVATION



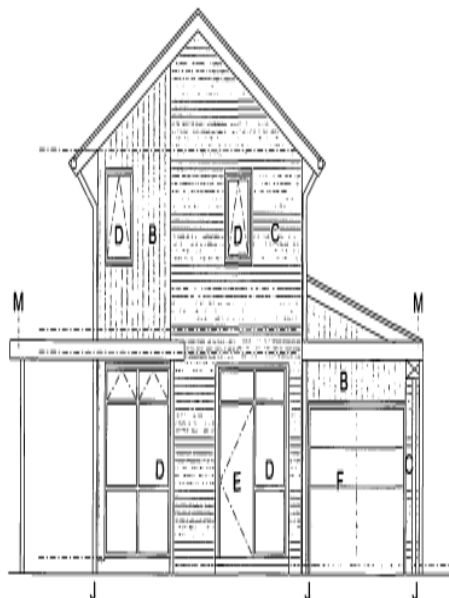
EAST ELEVATION

## ELEVATION KEY

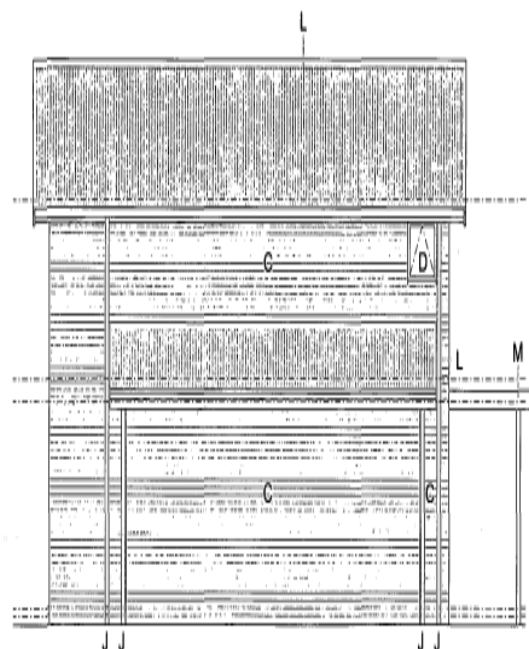
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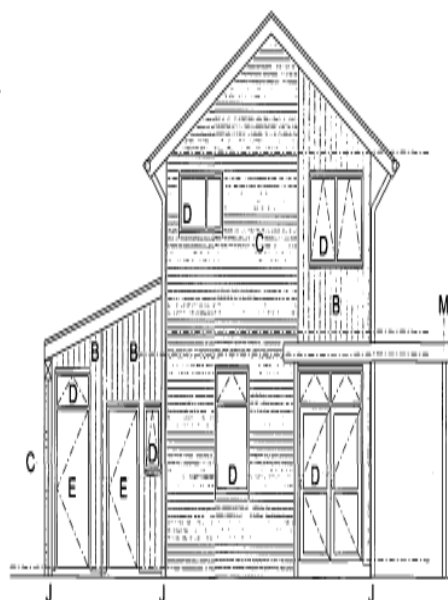
NORTH ELEVATION



WEST ELEVATION



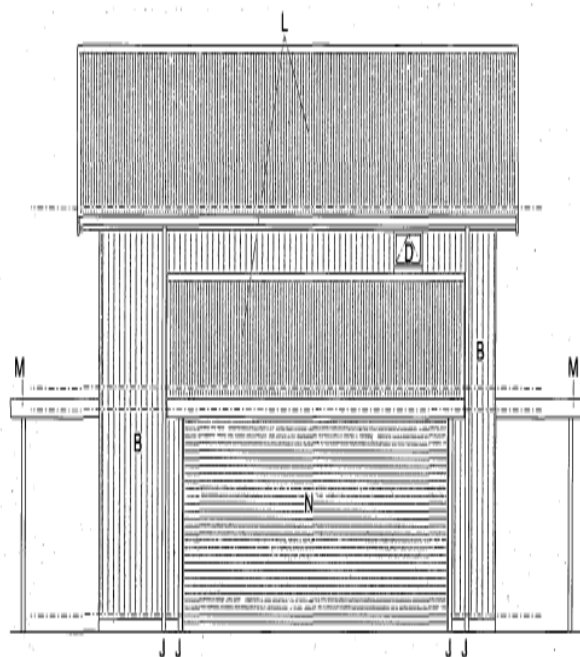
SOUTH ELEVATION



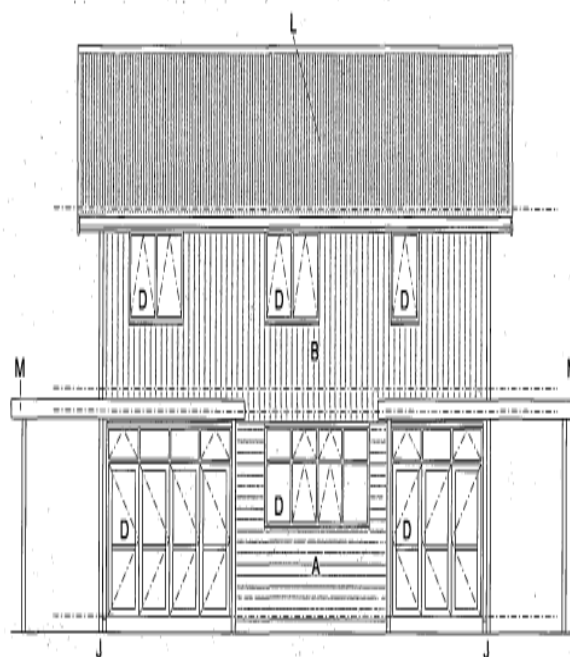
EAST ELEVATION

## ELEVATION KEY

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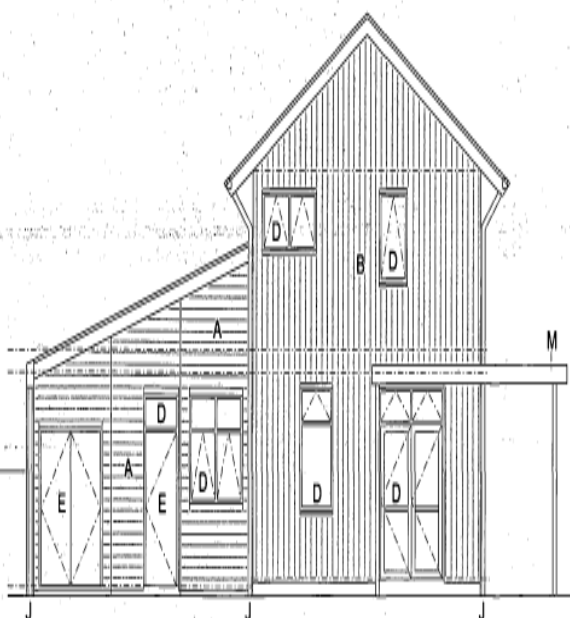
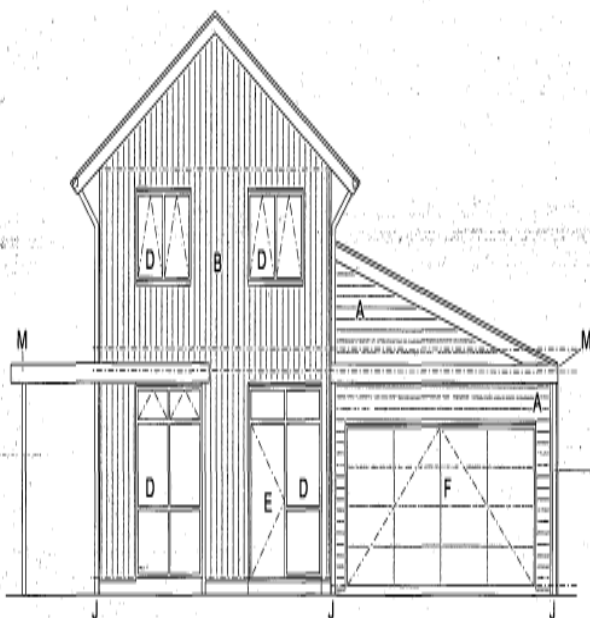
SOUTH ELEVATION

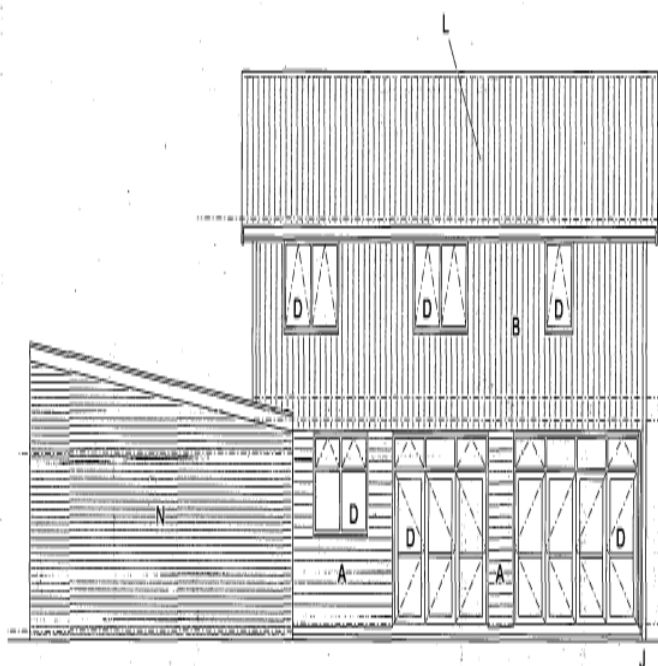


NORTH ELEVATION

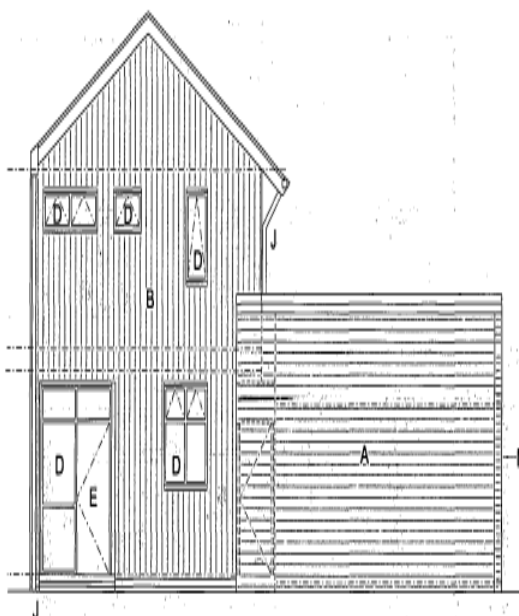
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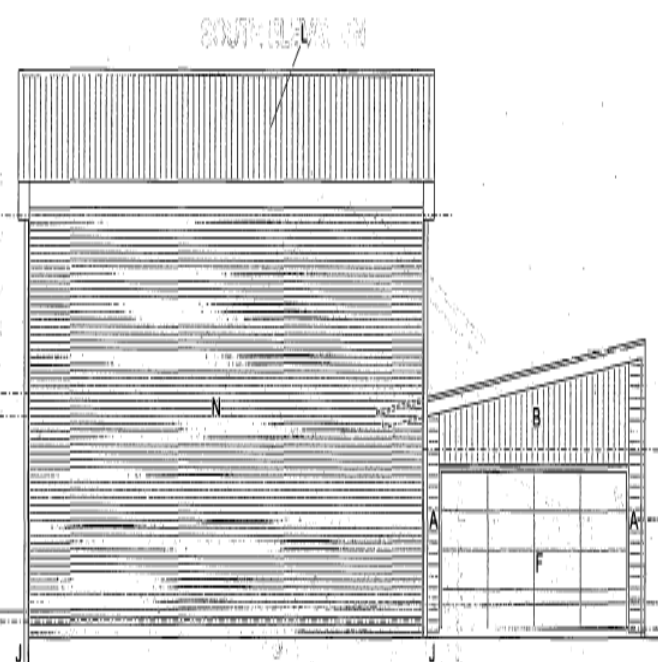




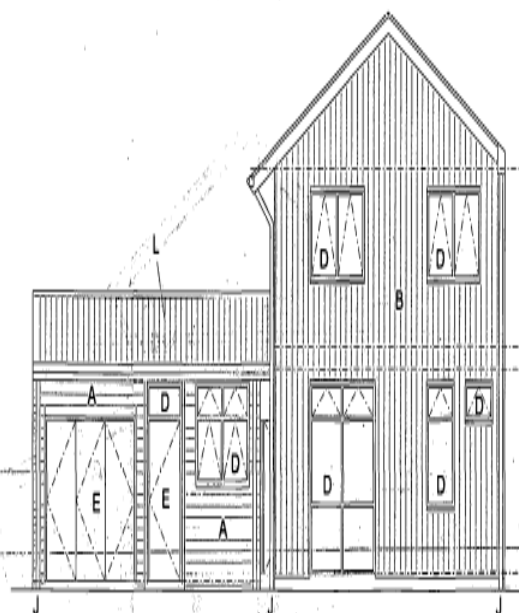
NORTH ELEVATION



EAST ELEVATION



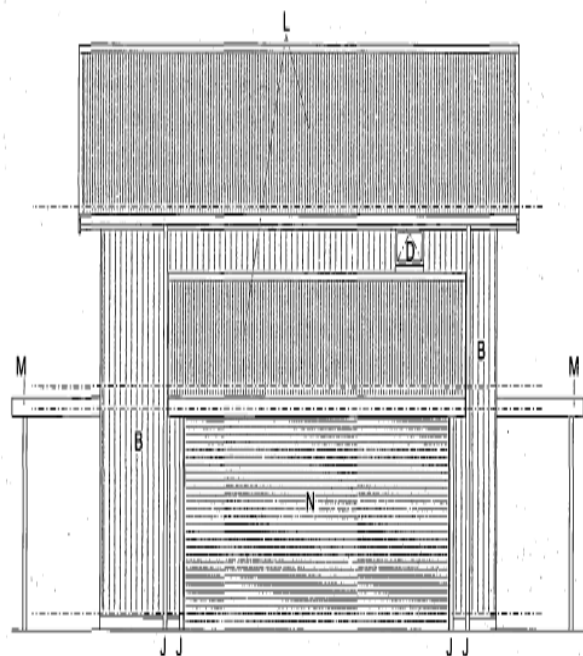
SOUTH ELEVATION



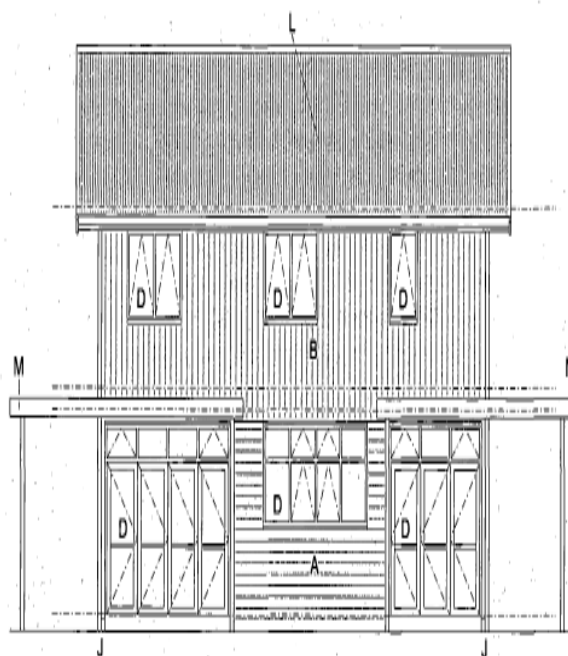
WEST ELEVATION

# ELEVATION KEY

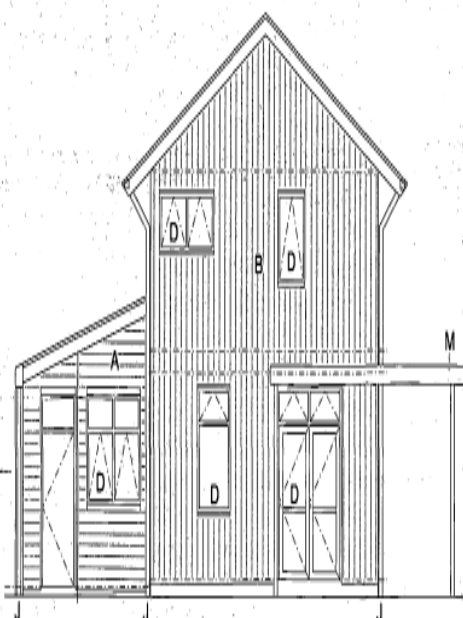
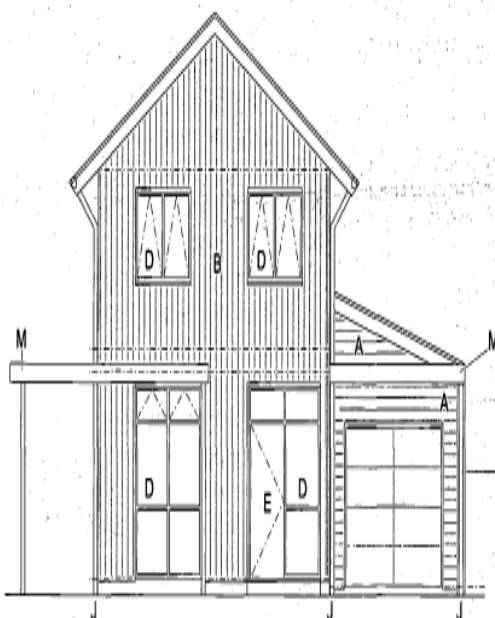
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SOUTH ELEVATION

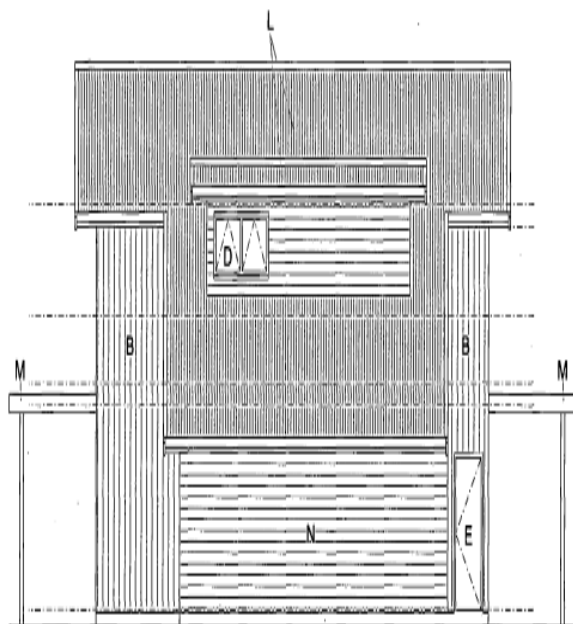


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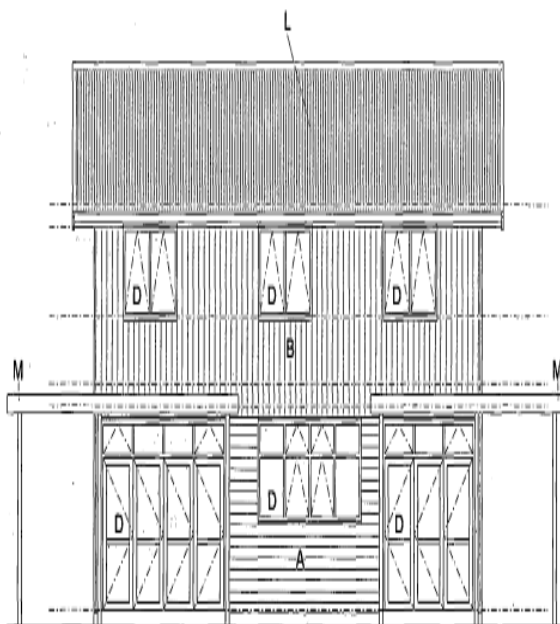


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SOUTH ELEVATION



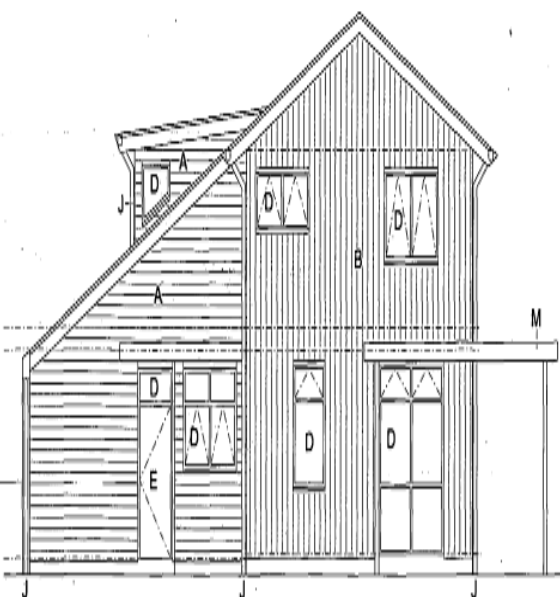
NORTH ELEVATION

## ELEVATION KEY

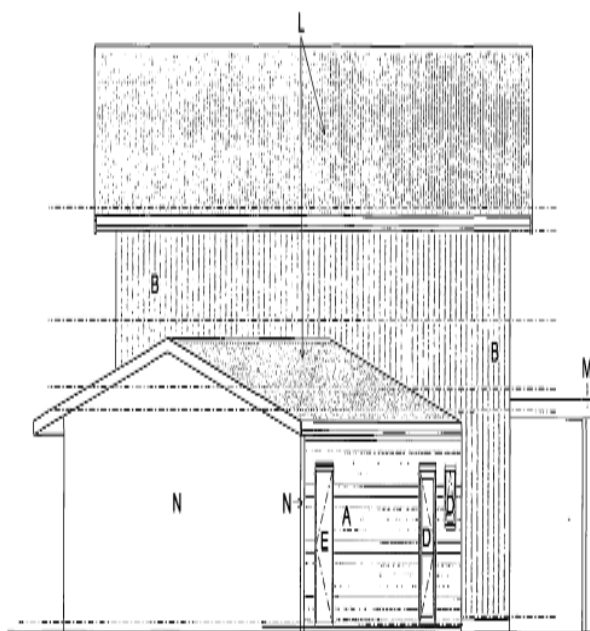
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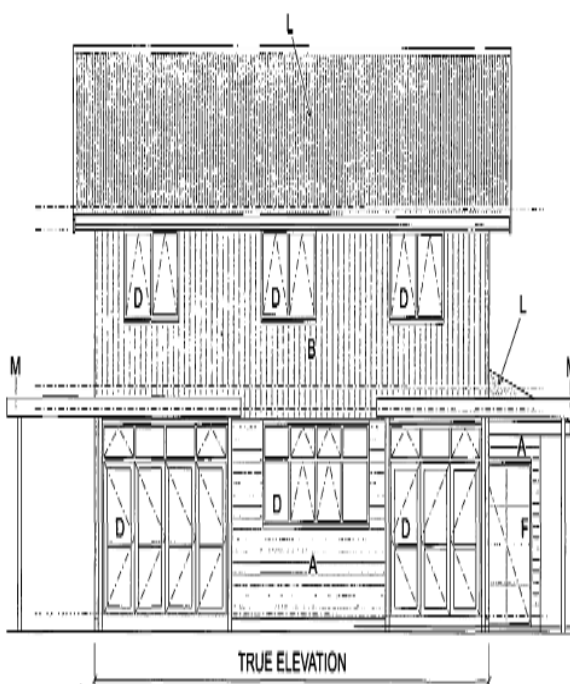
WEST ELEVATION



EAST ELEVATION



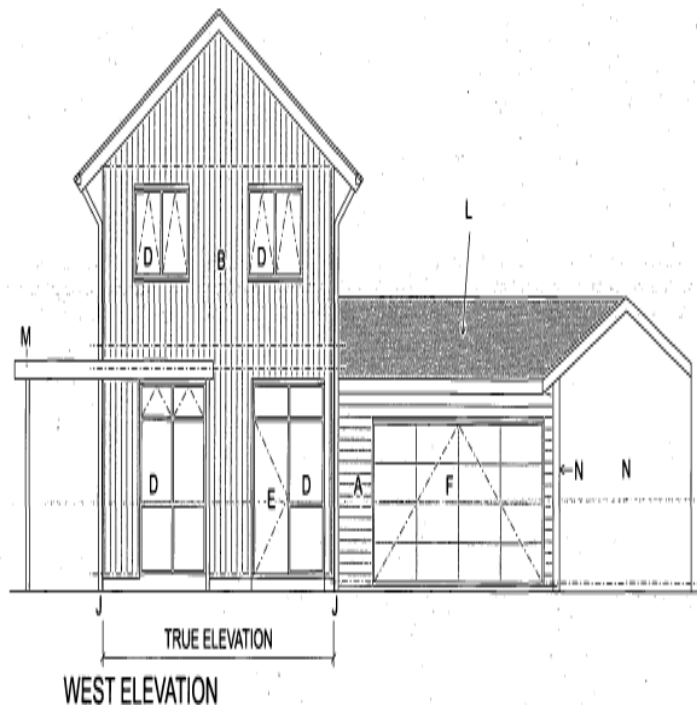
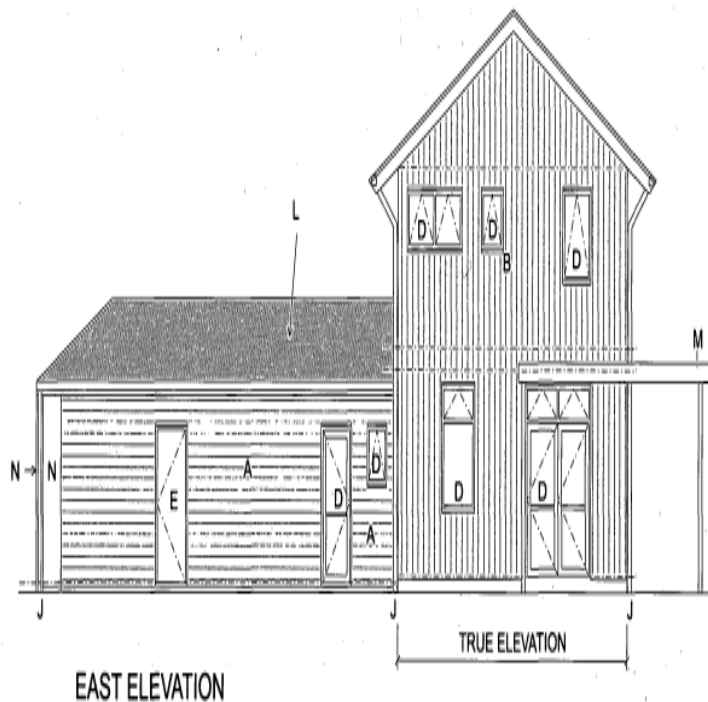
SOUTH ELEVATION



NORTH ELEVATION

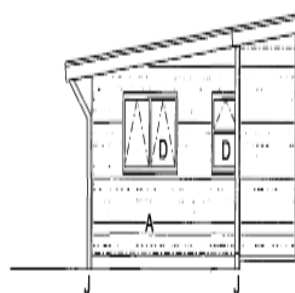
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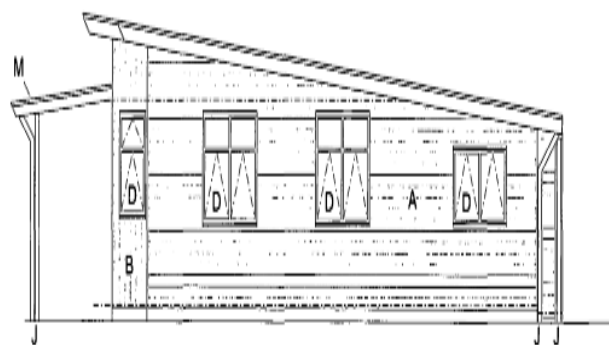


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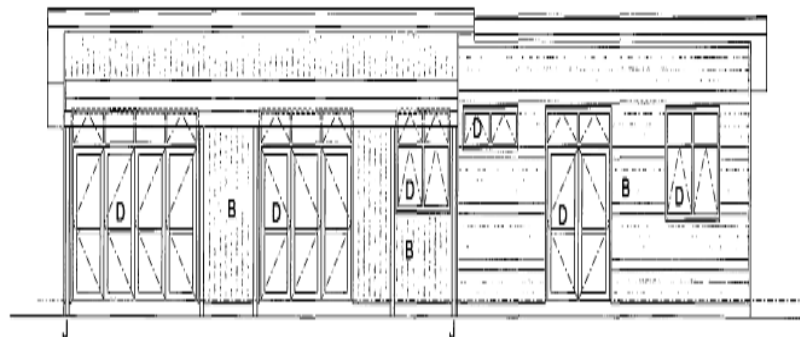
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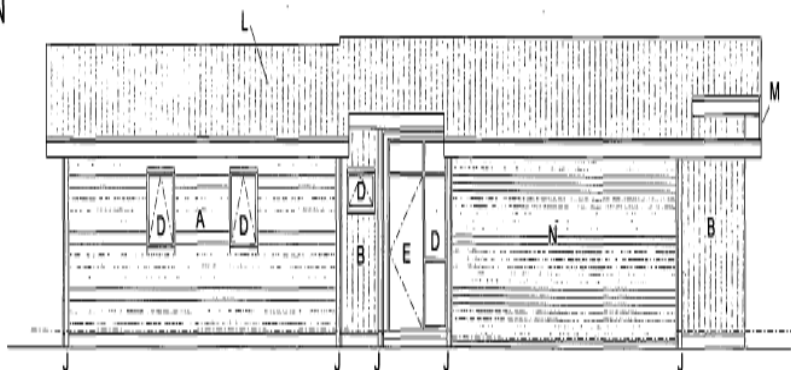
NORTH ELEVATION (COURTYARD)



SOUTH ELEVATION



WEST ELEVATION

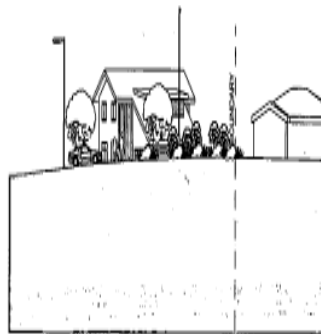


ELEVATION KEY

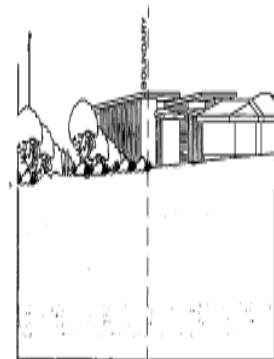
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1 ELEVATION 01  
A301 1:500



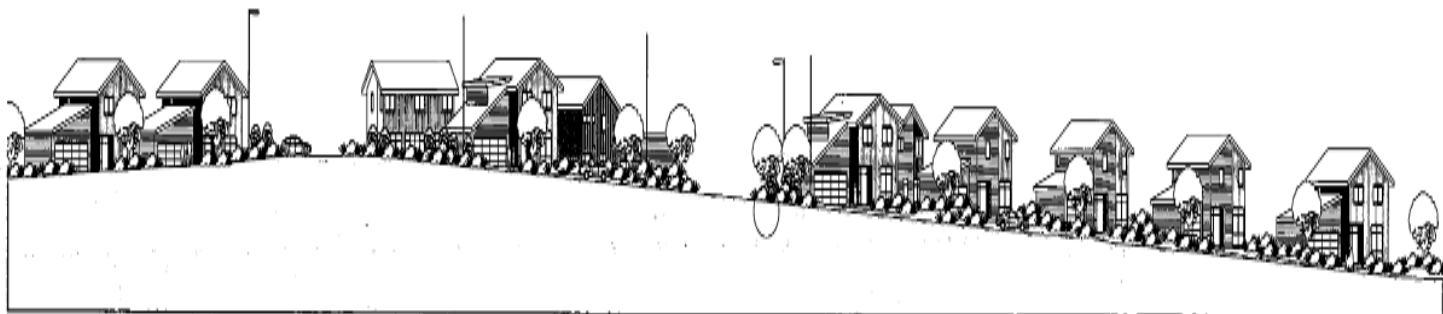
2 ELEVATION 02  
A301 1:500



3 ELEVATION 03  
A301 1:500



4 ELEVATION 04  
A301 1:500



5 ELEVATION 05  
A301 1:500



WEST COAST ROAD  
HOUSING DEVELOPMENT  
BULK & LOCATION STUDY

STREET  
ELEVATION  
07 JAN 2005  
A301  
REV.



1 ELEVATION 06  
A302 1:500



2 ELEVATION 07  
A302 1:500



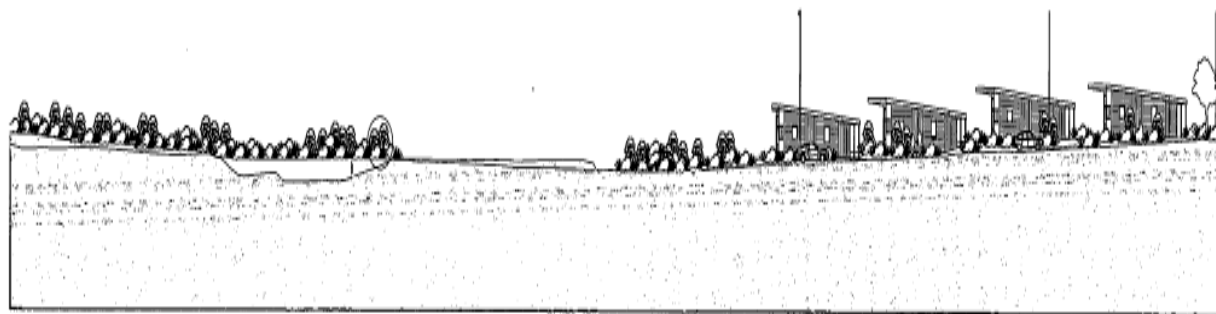
3 ELEVATION 08  
A302 1:500



4 ELEVATION 09  
A302 1:500



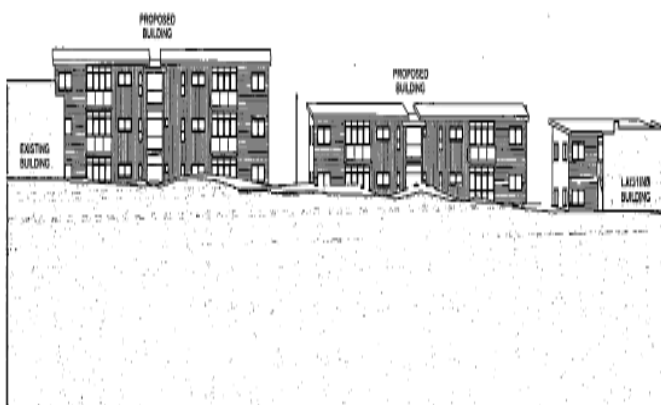
5 ELEVATION 10  
A302 1:500



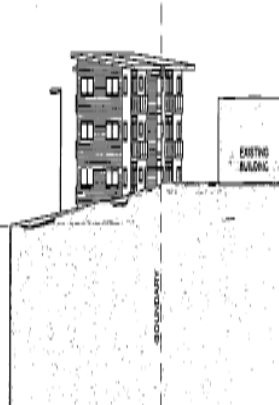
1 ELEVATION 11  
A303 1:500



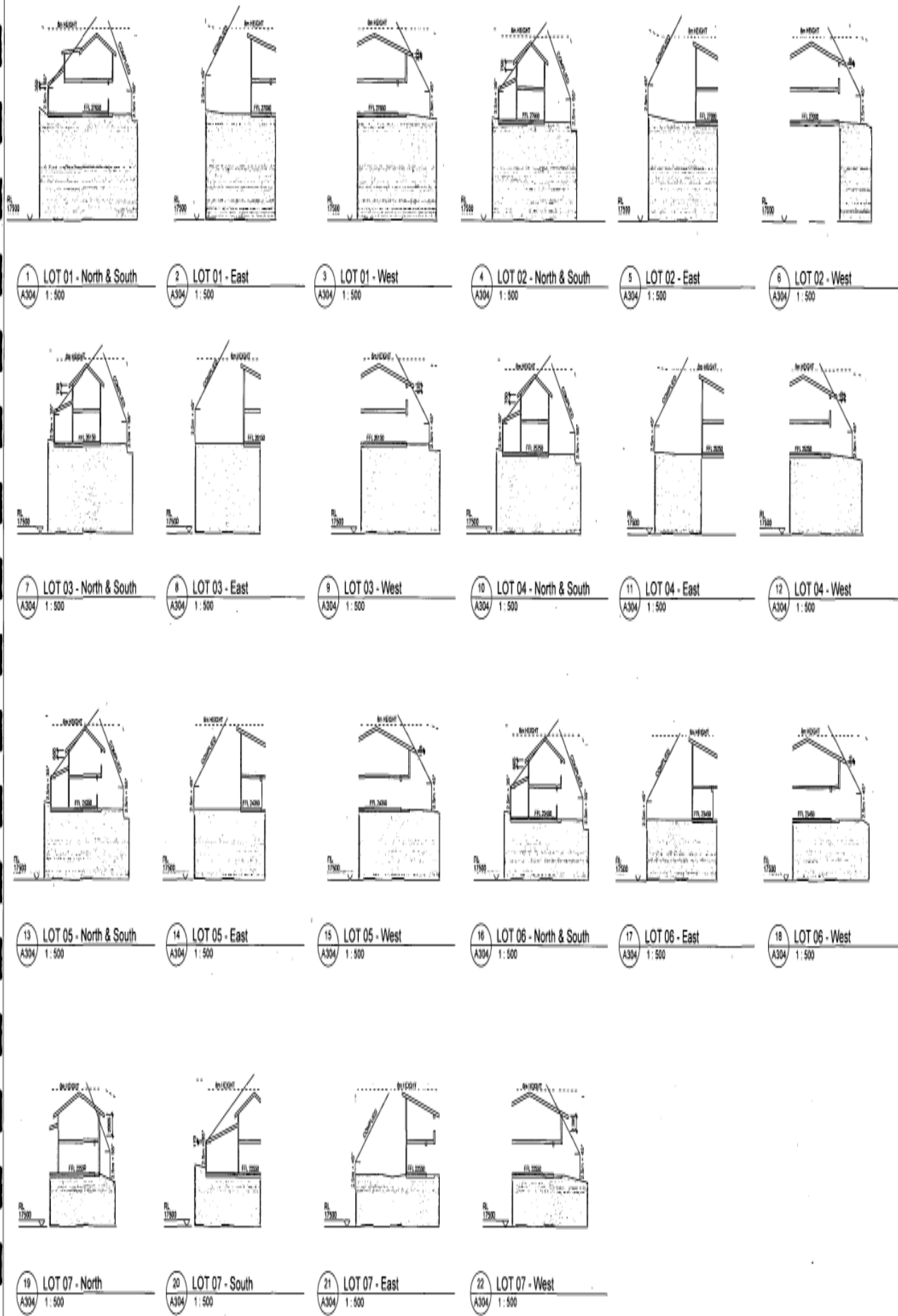
2 ELEVATION 12  
A303 1:500

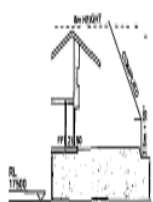


3 ELEVATION 13  
A303 1:500

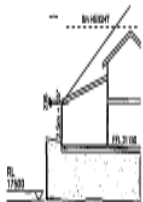


4 ELEVATION 14  
A303 1:500





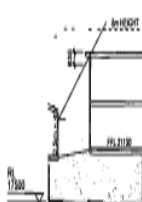
1 LOT 08 - North  
A305 1:500



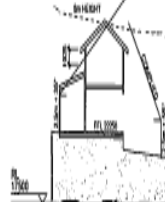
2 LOT 08 - South  
A305 1:500



3 LOT 08 - East  
A305 1:500



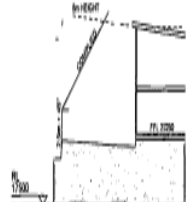
4 LOT 08 - West  
A305 1:500



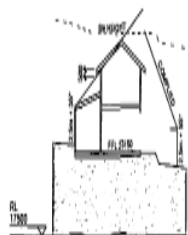
5 LOT 09 - North & South  
A305 1:500



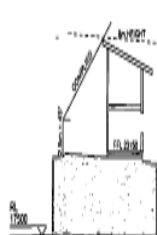
6 LOT 09 - East  
A305 1:500



7 LOT 09 - West  
A305 1:500



8 LOT 10 - North & South  
A305 1:500



9 LOT 10 - East  
A305 1:500



10 LOT 10 - West  
A305 1:500



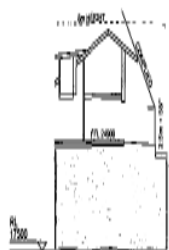
11 LOT 11 - North & South  
A305 1:500



12 LOT 11 - East  
A305 1:500



13 LOT 11 - West  
A305 1:500



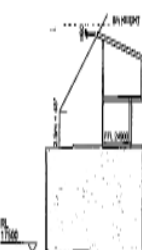
14 LOT 12 - North  
A305 1:500



15 LOT 12 - South 1  
A305 1:500



16 LOT 12 - South 2  
A305 1:500



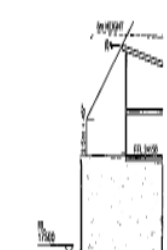
17 LOT 12 - East  
A305 1:500



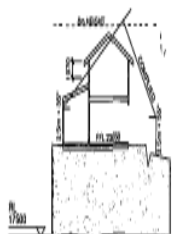
18 LOT 13 - North & South 1  
A305 1:500



19 LOT 13 - South 2  
A305 1:500



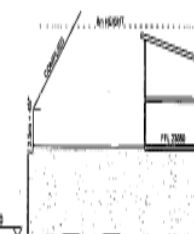
20 LOT 13 - East  
A305 1:500



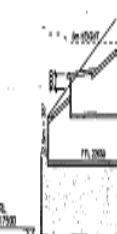
21 LOT 14 - North & South 1  
A305 1:500



22 LOT 14 - South 2  
A305 1:500



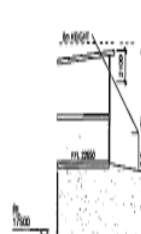
23 LOT 14 - East  
A305 1:500



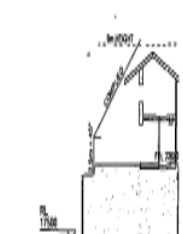
24 LOT 15 - South 1  
A305 1:500



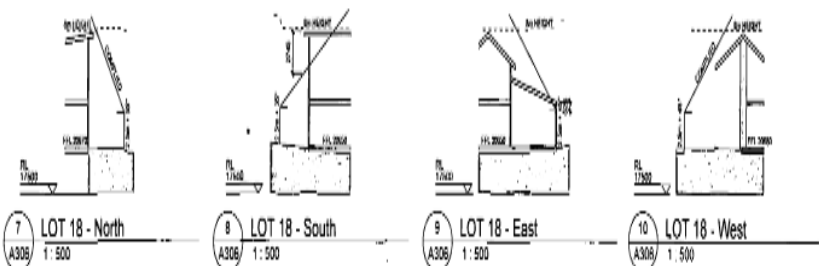
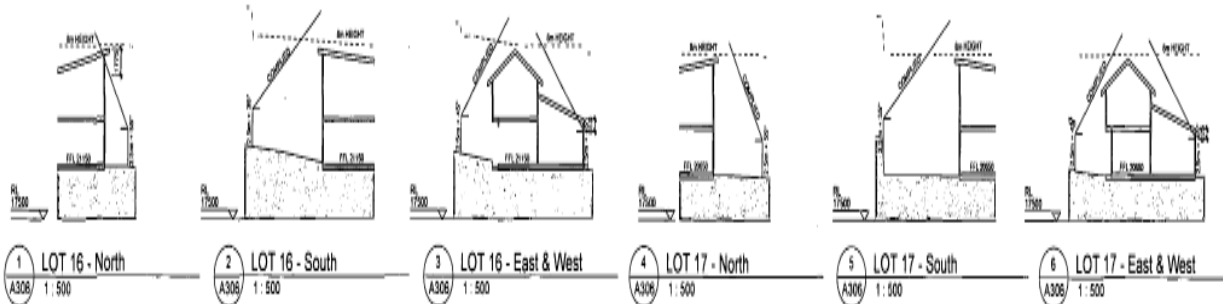
25 LOT 15 - South 2  
A305 1:500

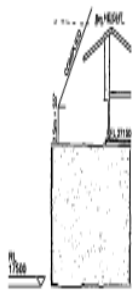


26 LOT 15 - East  
A305 1:500

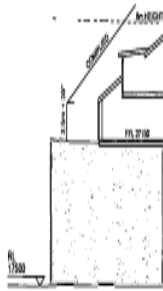


27 LOT 15 - West  
A305 1:500

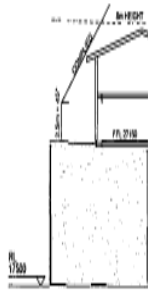




1 LOT 26 - North  
A307 1:500



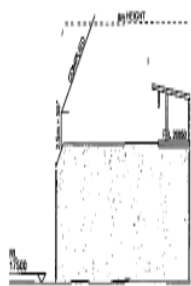
2 LOT 26 - South  
A307 1:500



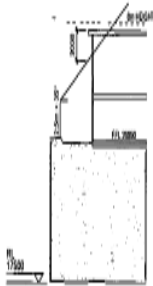
3 LOT 26 - East  
A307 1:500



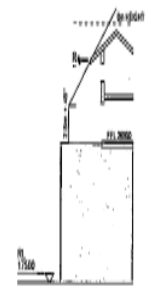
4 LOT 26 - West  
A307 1:500



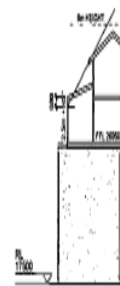
5 LOT 27 - North  
A307 1:500



6 LOT 27 - South  
A307 1:500



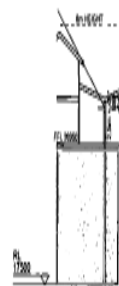
7 LOT 27 - East  
A307 1:500



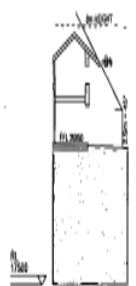
8 LOT 27 - West  
A307 1:500



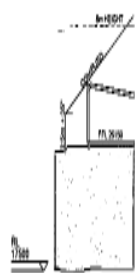
9 LOT 28 - South  
A307 1:500



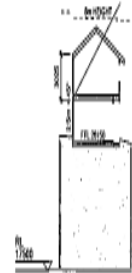
10 LOT 28 - East  
A307 1:500



11 LOT 28 - West  
A307 1:500



12 LOT 29 - South  
A307 1:500



13 LOT 29 - East  
A307 1:500



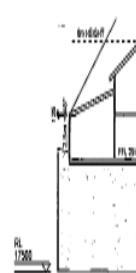
14 LOT 29 - West  
A307 1:500



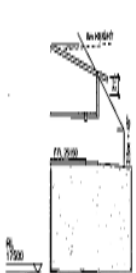
15 LOT 30 - North  
A307 1:500



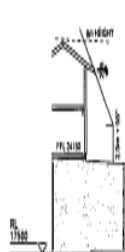
16 LOT 30 - East 1  
A307 1:500



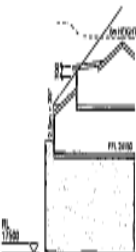
17 LOT 30 - East 2  
A307 1:500



18 LOT 30 - West  
A307 1:500



19 LOT 31 - North  
A307 1:500



20 LOT 31 - South  
A307 1:500



21 LOT 31 - East  
A307 1:500

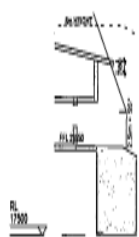


22 LOT 31 - West  
A307 1:500

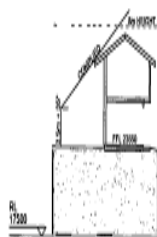


**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

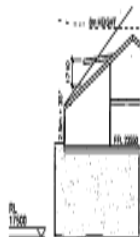
**SECTIONS  
STAGE 1C**  
13 JUN 2008  
A307  
REV.



1 LOT 32 - North  
A308 1:500



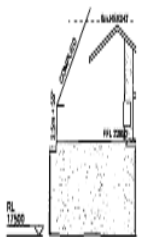
2 LOT 32 - South 1  
A308 1:500



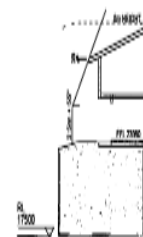
3 LOT 32 - South 2  
A308 1:500



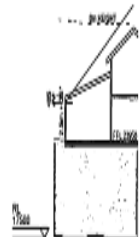
4 LOT 32 - West  
A308 1:500



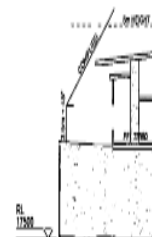
5 LOT 33 - North 1  
A308 1:500



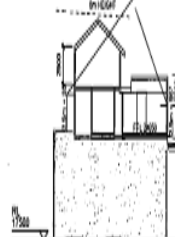
6 LOT 33 - North 2  
A308 1:500



7 LOT 33 - South  
A308 1:500



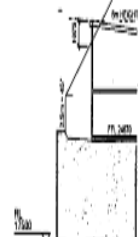
8 LOT 33 - West  
A308 1:500



9 LOT 34 - North 1 & South  
A308 1:500



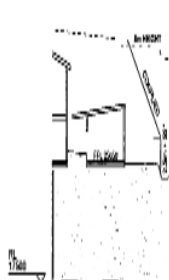
10 LOT 34 - North 2  
A308 1:500



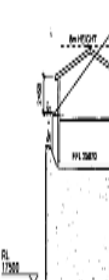
11 LOT 34 - West  
A308 1:500



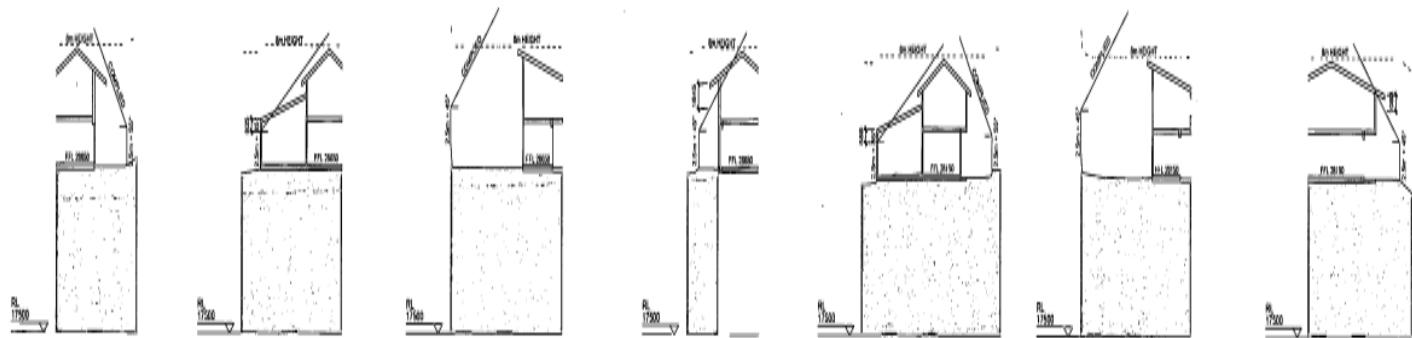
12 LOT 35 - North 1 & South 1  
A308 1:500



13 LOT 35 - North 2  
A308 1:500



14 LOT 35 - South 2  
A308 1:500



1 LOT 19 - North  
A309 1:500

2 LOT 19 - South  
A309 1:500

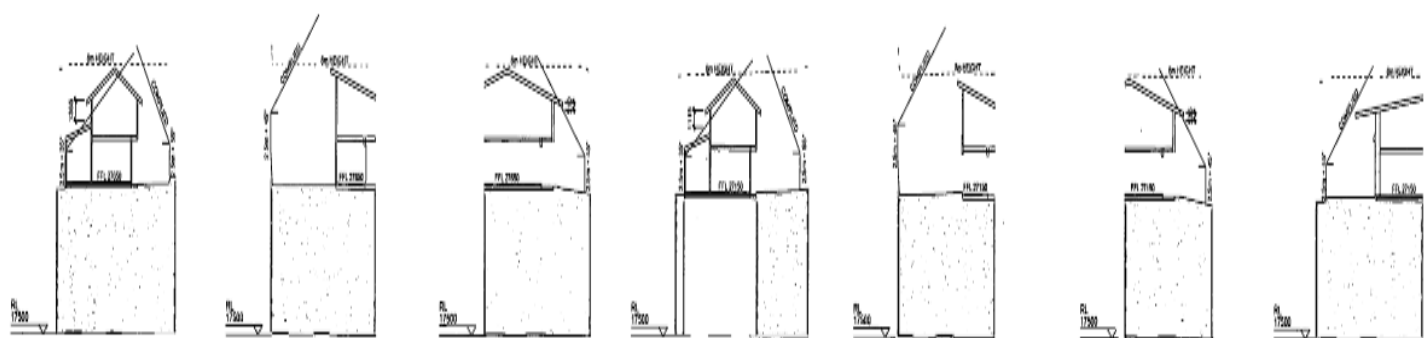
3 LOT 19 - East  
A309 1:500

4 LOT 19 - West  
A309 1:500

5 LOT 20 - North & South  
A309 1:500

6 LOT 20 - East  
A309 1:500

7 LOT 20 - West  
A309 1:500



8 LOT 21 - North & South  
A309 1:500

9 LOT 21 - East  
A309 1:500

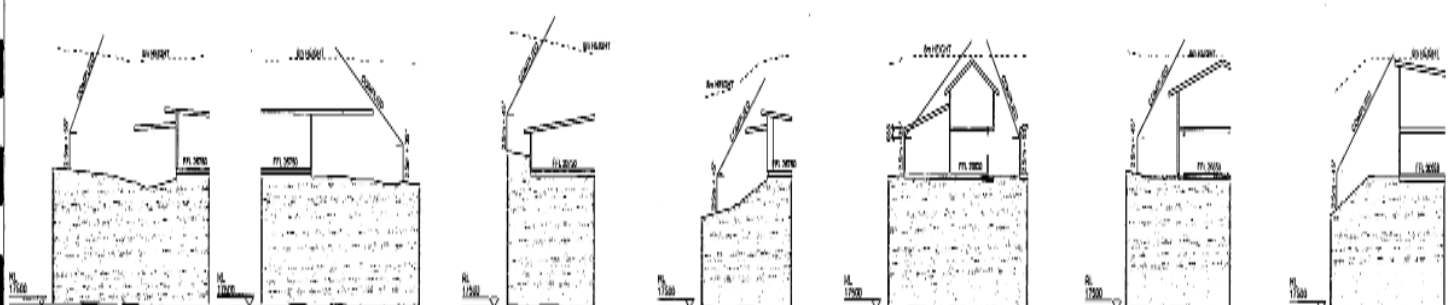
10 LOT 21 - West  
A309 1:500

11 LOT 22 - North & South  
A309 1:500

12 LOT 22 - East  
A309 1:500

13 LOT 22 - West 1  
A309 1:500

14 LOT 22 - West 2  
A309 1:500



15 LOT 23 - North  
A309 1:500

16 LOT 23 - South  
A309 1:500

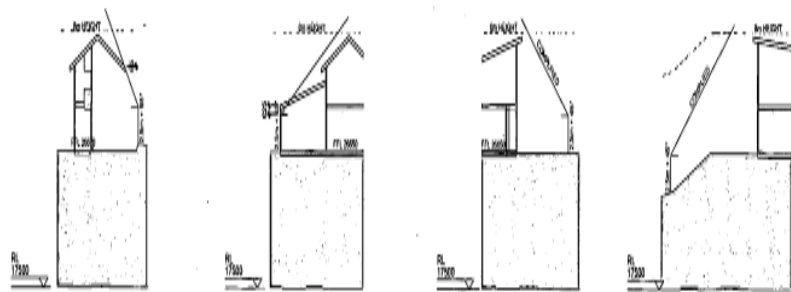
17 LOT 23 - East  
A309 1:500

18 LOT 23 - West  
A309 1:500

19 LOT 24 - North & South  
A309 1:500

20 LOT 24 - East  
A309 1:500

21 LOT 24 - West  
A309 1:500



22 LOT 25 - North  
A309 1:500

23 LOT 25 - South  
A309 1:500

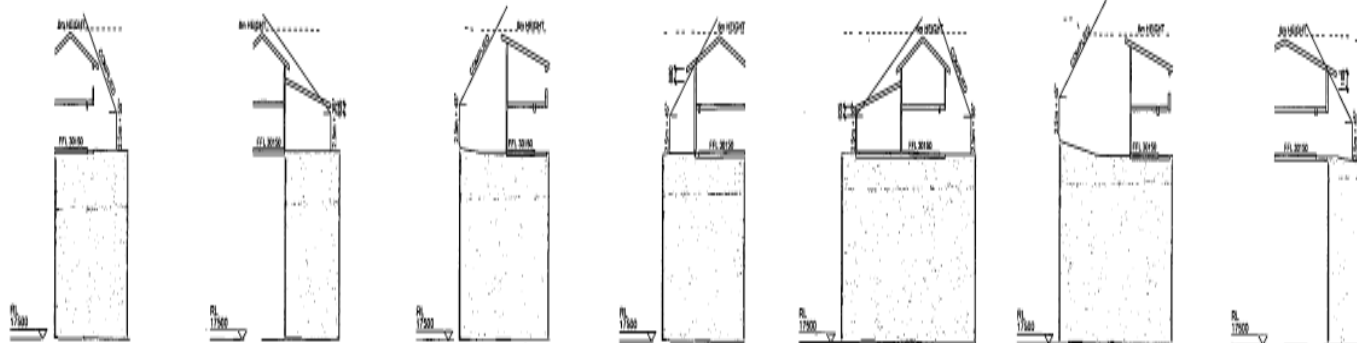
24 LOT 25 - East  
A309 1:500

25 LOT 25 - West  
A309 1:500



**WEST COAST ROAD**  
**HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

**SECTIONS**  
**STAGE 1D**  
03 JUN 2005  
A309



1 LOT 36 - North  
A310 1:500

2 LOT 36 - South  
A310 1:500

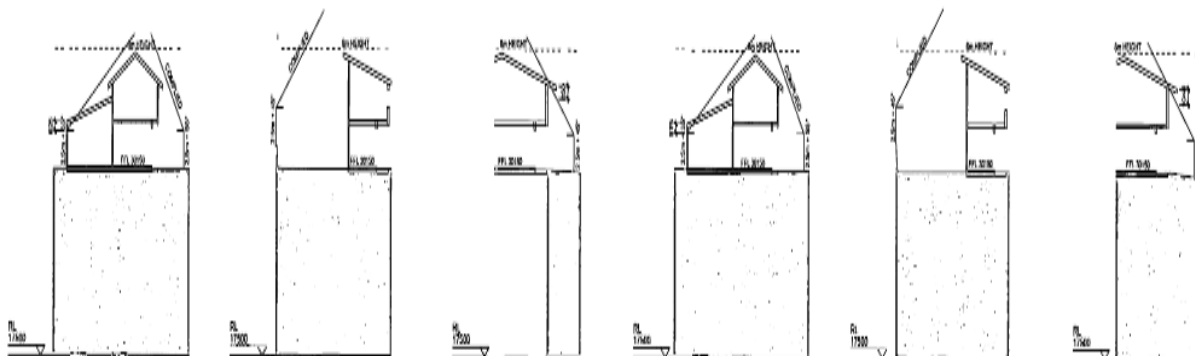
3 LOT 36 - East  
A310 1:500

4 LOT 36 - West  
A310 1:500

5 LOT 37 - North & South  
A310 1:500

6 LOT 37 - East  
A310 1:500

7 LOT 37 - West  
A310 1:500



8 LOT 38 - North & South  
A310 1:500

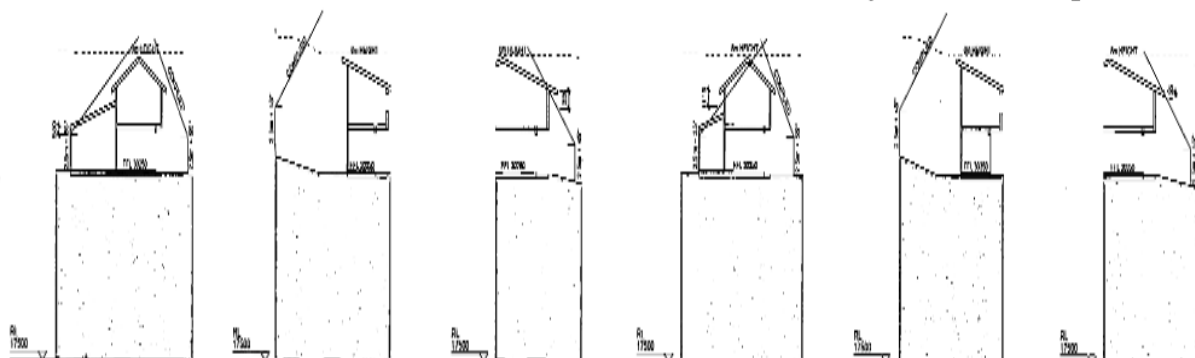
9 LOT 38 - East  
A310 1:500

10 LOT 38 - West  
A310 1:500

11 LOT 39 - North & South  
A310 1:500

12 LOT 39 - East  
A310 1:500

13 LOT 39 - West  
A310 1:500



14 LOT 40 - North & South  
A310 1:500

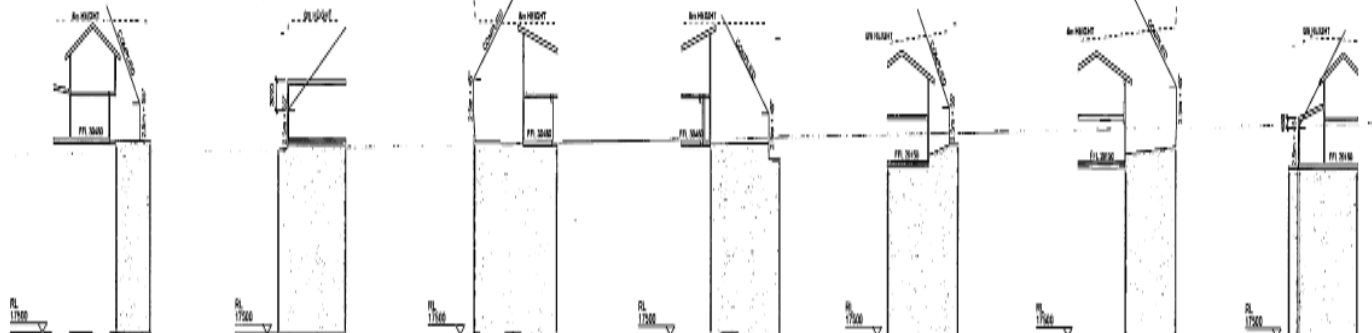
15 LOT 40 - East  
A310 1:500

16 LOT 40 - West  
A310 1:500

17 LOT 41 - North & South  
A310 1:500

18 LOT 41 - East  
A310 1:500

19 LOT 41 - West  
A310 1:500



23 LOT 42 - North  
A310 1:500

24 LOT 42 - South  
A310 1:500

25 LOT 42 - East  
A310 1:500

26 LOT 42 - West  
A310 1:500

20 LOT 43 - North  
A310 1:500

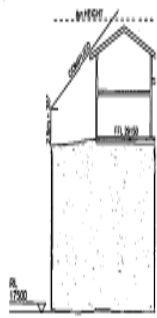
21 LOT 43 - East  
A310 1:500

22 LOT 43 - West  
A310 1:500

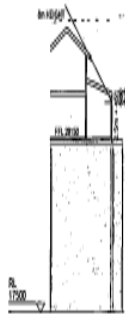


**WEST COAST ROAD**  
**HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

**SECTIONS**  
**STAGE 2A**  
05-JUN-2015  
A310



1 LOT 44 - South  
A311 1:500



2 LOT 44 - East  
A311 1:500



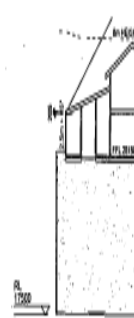
3 LOT 44 - West  
A311 1:500



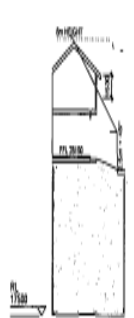
4 LOT 45 - North  
A311 1:500



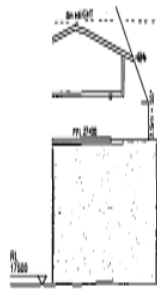
5 LOT 45 - South  
A311 1:500



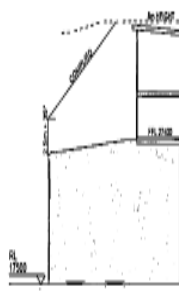
6 LOT 45 - East  
A311 1:500



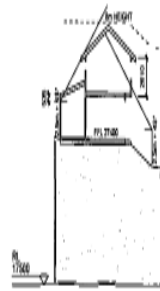
7 LOT 45 - West  
A311 1:500



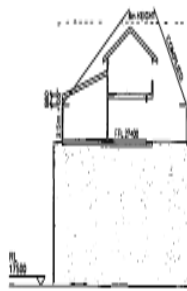
8 LOT 46 - North  
A311 1:500



9 LOT 46 - South  
A311 1:500



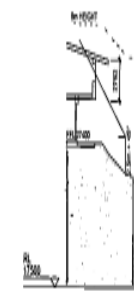
10 LOT 46 - East & West  
A311 1:500



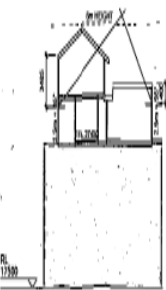
11 LOT 47 - North & South  
A311 1:500



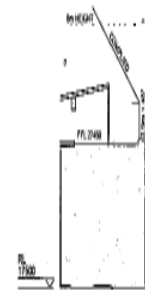
12 LOT 47 - East  
A311 1:500



13 LOT 47 - West  
A311 1:500



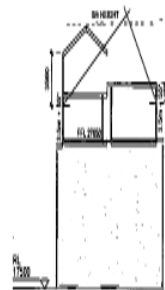
14 LOT 48 - North & South  
A311 1:500



15 LOT 48 - East  
A311 1:500



16 LOT 48 - West  
A311 1:500



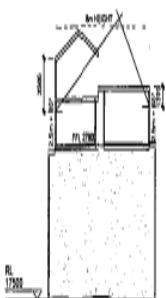
17 LOT 49 - North & South  
A311 1:500



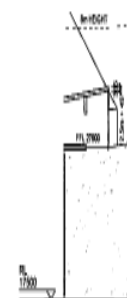
18 LOT 49 - East  
A311 1:500



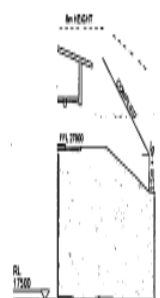
19 LOT 49 - West  
A311 1:500



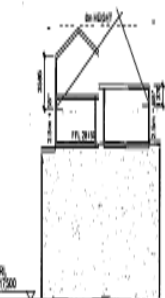
20 LOT 50 - North & South  
A311 1:500



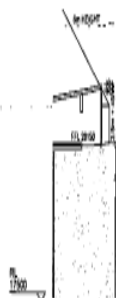
21 LOT 50 - East  
A311 1:500



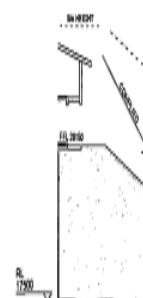
22 LOT 50 - West  
A311 1:500



23 LOT 51 - North & South  
A311 1:500



24 LOT 51 - East  
A311 1:500

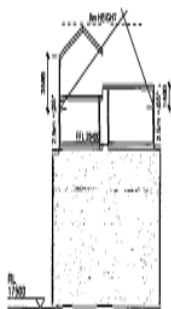


25 LOT 51 - West  
A311 1:500

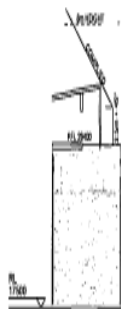


**WEST COAST ROAD  
HOUSING DEVELOPMENT**  
BULK & LOCATION STUDY

**SECTIONS  
STAGE 2A &  
2B**  
A311



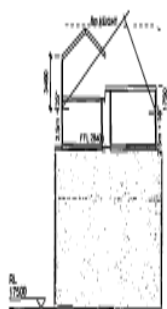
1 LOT 52 - North & South  
A312 1:500



2 LOT 52 - East  
A312 1:500



3 LOT 52 - West  
A312 1:500



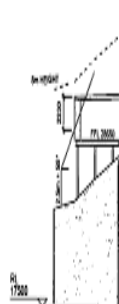
4 LOT 53 - North & South  
A312 1:500



5 LOT 53 - East  
A312 1:500



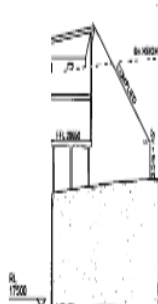
6 LOT 53 - West  
A312 1:500



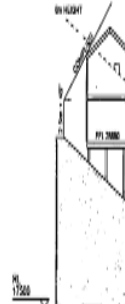
7 LOT 54 - North  
A312 1:500



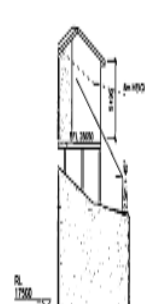
8 LOT 54 - South  
A312 1:500



9 LOT 54 - East 1  
A312 1:500



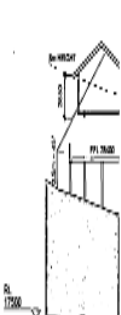
10 LOT 54 - East 2  
A312 1:500



11 LOT 54 - West  
A312 1:500



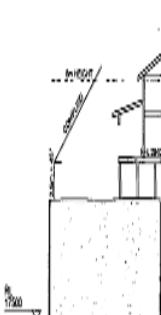
13 LOT 55 - South  
A312 1:500



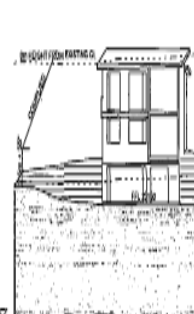
14 LOT 55 - East  
A312 1:500



12 LOT 55 - West 1  
A312 1:500



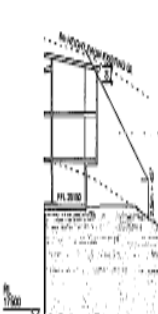
15 LOT 55 - West 2  
A312 1:500



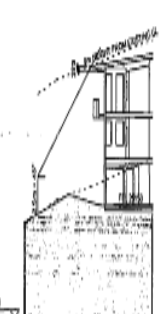
16 LOT 56 - North  
A312 1:500



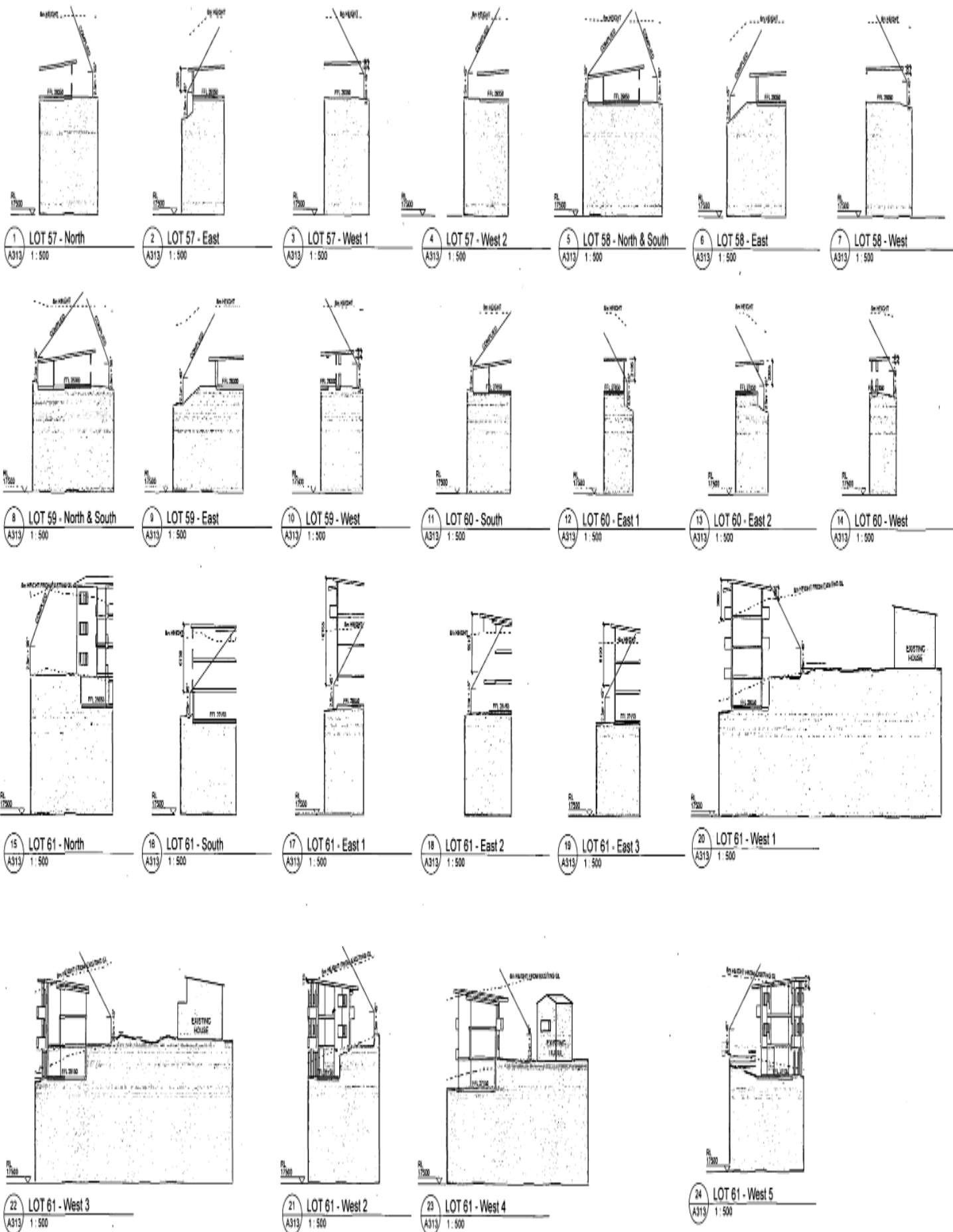
17 LOT 56 - East  
A312 1:500



18 LOT 56 - West 1  
A312 1:500



19 LOT 56 - West 2  
A312 1:500



## STAGE 1A

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 01	415 m <sup>2</sup>	109 m <sup>2</sup>	26.3%	209 m <sup>2</sup>	50.4%
LOT 02	380 m <sup>2</sup>	86 m <sup>2</sup>	22.6%	154 m <sup>2</sup>	40.5%
LOT 03	380 m <sup>2</sup>	86 m <sup>2</sup>	22.6%	154 m <sup>2</sup>	40.5%
LOT 04	380 m <sup>2</sup>	86 m <sup>2</sup>	30.5%	154 m <sup>2</sup>	40.5%
LOT 05	380 m <sup>2</sup>	92 m <sup>2</sup>	23.9%	164 m <sup>2</sup>	43.2%
LOT 06	380 m <sup>2</sup>	92 m <sup>2</sup>	24.2%	164 m <sup>2</sup>	43.2%
LOT 07	381 m <sup>2</sup>	109 m <sup>2</sup>	28.6%	199 m <sup>2</sup>	52.2%

## STAGE 1B

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 08	403 m <sup>2</sup>	109 m <sup>2</sup>	27.0%	176 m <sup>2</sup>	43.7%
LOT 09	402 m <sup>2</sup>	86 m <sup>2</sup>	21.4%	143 m <sup>2</sup>	35.6%
LOT 10	388 m <sup>2</sup>	86 m <sup>2</sup>	22.2%	143 m <sup>2</sup>	36.9%
LOT 11	353 m <sup>2</sup>	86 m <sup>2</sup>	24.4%	143 m <sup>2</sup>	40.5%
LOT 12	374 m <sup>2</sup>	109 m <sup>2</sup>	29.1%	171 m <sup>2</sup>	45.7%
LOT 13	350 m <sup>2</sup>	86 m <sup>2</sup>	24.6%	140 m <sup>2</sup>	40.0%
LOT 14	433 m <sup>2</sup>	86 m <sup>2</sup>	19.9%	149 m <sup>2</sup>	34.4%
LOT 15	363 m <sup>2</sup>	109 m <sup>2</sup>	30.0%	176 m <sup>2</sup>	48.5%
LOT 16	395 m <sup>2</sup>	109 m <sup>2</sup>	27.6%	186 m <sup>2</sup>	47.1%
LOT 17	475 m <sup>2</sup>	109 m <sup>2</sup>	22.9%	203 m <sup>2</sup>	42.9%
LOT 18	353 m <sup>2</sup>	109 m <sup>2</sup>	30.9%	191 m <sup>2</sup>	54.1%

## STAGE 1C

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 26	451 m <sup>2</sup>	109 m <sup>2</sup>	24.2%	172 m <sup>2</sup>	38.1%
LOT 27	354 m <sup>2</sup>	86 m <sup>2</sup>	24.3%	139 m <sup>2</sup>	39.3%
LOT 28	413 m <sup>2</sup>	86 m <sup>2</sup>	20.8%	139 m <sup>2</sup>	33.7%
LOT 29	412 m <sup>2</sup>	114 m <sup>2</sup>	27.7%	217 m <sup>2</sup>	52.7%
LOT 30	438 m <sup>2</sup>	109 m <sup>2</sup>	24.8%	203 m <sup>2</sup>	46.3%
LOT 31	371 m <sup>2</sup>	109 m <sup>2</sup>	29.4%	217 m <sup>2</sup>	58.5%
LOT 32	349 m <sup>2</sup>	109 m <sup>2</sup>	31.2%	193 m <sup>2</sup>	55.3%
LOT 33	383 m <sup>2</sup>	109 m <sup>2</sup>	28.5%	214 m <sup>2</sup>	55.9%
LOT 34	411 m <sup>2</sup>	114 m <sup>2</sup>	35.0%	239 m <sup>2</sup>	58.2%
LOT 35	415 m <sup>2</sup>	114 m <sup>2</sup>	27.5%	248 m <sup>2</sup>	59.0%

## STAGE 1D

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 19	405 m <sup>2</sup>	109 m <sup>2</sup>	26.9%	201 m <sup>2</sup>	49.6%
LOT 20	434 m <sup>2</sup>	109 m <sup>2</sup>	25.1%	201 m <sup>2</sup>	46.3%
LOT 21	397 m <sup>2</sup>	92 m <sup>2</sup>	23.2%	165 m <sup>2</sup>	41.6%
LOT 22	405 m <sup>2</sup>	92 m <sup>2</sup>	22.7%	157 m <sup>2</sup>	38.8%
LOT 23	840 m <sup>2</sup>	191 m <sup>2</sup>	22.7%	313 m <sup>2</sup>	37.3%
LOT 24	404 m <sup>2</sup>	109 m <sup>2</sup>	27.0%	186 m <sup>2</sup>	46.0%
LOT 25	506 m <sup>2</sup>	109 m <sup>2</sup>	21.5%	209 m <sup>2</sup>	41.3%

## STAGE 2A

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 36	457 m <sup>2</sup>	109 m <sup>2</sup>	23.9%	223 m <sup>2</sup>	48.8%
LOT 37	426 m <sup>2</sup>	109 m <sup>2</sup>	25.6%	205 m <sup>2</sup>	48.1%
LOT 38	439 m <sup>2</sup>	109 m <sup>2</sup>	24.8%	205 m <sup>2</sup>	46.7%
LOT 39	439 m <sup>2</sup>	109 m <sup>2</sup>	24.8%	205 m <sup>2</sup>	46.7%
LOT 40	439 m <sup>2</sup>	109 m <sup>2</sup>	24.8%	205 m <sup>2</sup>	46.7%
LOT 41	370 m <sup>2</sup>	92 m <sup>2</sup>	24.9%	173 m <sup>2</sup>	46.8%
LOT 42	431 m <sup>2</sup>	126 m <sup>2</sup>	29.2%	229 m <sup>2</sup>	53.1%
LOT 43	444 m <sup>2</sup>	86 m <sup>2</sup>	19.4%	165 m <sup>2</sup>	37.2%
LOT 44	459 m <sup>2</sup>	86 m <sup>2</sup>	18.7%	165 m <sup>2</sup>	35.9%
LOT 45	370 m <sup>2</sup>	109 m <sup>2</sup>	29.5%	188 m <sup>2</sup>	50.8%
LOT 46	377 m <sup>2</sup>	92 m <sup>2</sup>	24.4%	152 m <sup>2</sup>	40.3%

## STAGE 2B

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 47	372 m <sup>2</sup>	109 m <sup>2</sup>	29.3%	168 m <sup>2</sup>	45.2%
LOT 48	361 m <sup>2</sup>	114 m <sup>2</sup>	31.6%	211 m <sup>2</sup>	58.4%
LOT 49	369 m <sup>2</sup>	114 m <sup>2</sup>	30.9%	199 m <sup>2</sup>	53.9%
LOT 50	363 m <sup>2</sup>	114 m <sup>2</sup>	31.4%	192 m <sup>2</sup>	52.9%
LOT 51	366 m <sup>2</sup>	114 m <sup>2</sup>	31.1%	190 m <sup>2</sup>	51.9%
LOT 52	364 m <sup>2</sup>	114 m <sup>2</sup>	31.3%	193 m <sup>2</sup>	53.0%
LOT 53	354 m <sup>2</sup>	114 m <sup>2</sup>	32.2%	199 m <sup>2</sup>	56.2%
LOT 54	469 m <sup>2</sup>	114 m <sup>2</sup>	24.3%	236 m <sup>2</sup>	50.3%
LOT 55	370 m <sup>2</sup>	92 m <sup>2</sup>	24.9%	166 m <sup>2</sup>	44.9%
LOT 56	1416 m <sup>2</sup>	177 m <sup>2</sup>	12.5%	603 m <sup>2</sup>	42.6%

## STAGE 3

LOT NO	LOT AREA	BUILDING AREA	%	IMPERMEABLE AREA	%
LOT 57	268 m <sup>2</sup>	81 m <sup>2</sup>	30.2%	126 m <sup>2</sup>	47.0%
LOT 58	263 m <sup>2</sup>	81 m <sup>2</sup>	30.8%	129 m <sup>2</sup>	49.0%
LOT 59	273 m <sup>2</sup>	81 m <sup>2</sup>	29.7%	131 m <sup>2</sup>	48.0%
LOT 60	318 m <sup>2</sup>	81 m <sup>2</sup>	25.5%	124 m <sup>2</sup>	39.0%
LOT 61	3743 m <sup>2</sup>	632 m <sup>2</sup>	16.9%	2474 m <sup>2</sup>	66.1%

## STAGE 1A, 1B, 1C, 1D, 2A &amp; 2B

SITE AREA	49335 m <sup>2</sup>
SUM OF LOT AREA	23828 m <sup>2</sup>
SUM OF BUILDING AREA	5926 m <sup>2</sup>
SUM OF IMPERMEABLE AREA	10903 m <sup>2</sup>
TOTAL IMPERMEABLE AREA (BUILDING COVERAGE + PAVED AREA)	20888 m <sup>2</sup> = 41.9% OF SITE AREA

## STAGE 3

SITE AREA	7870 m <sup>2</sup>
SUM OF LOT AREA	4865 m <sup>2</sup>
SUM OF BUILDING AREA	956 m <sup>2</sup>
SUM OF IMPERMEABLE AREA	2984 m <sup>2</sup>
TOTAL IMPERMEABLE AREA (BUILDING COVERAGE + PAVED AREA)	2984 m <sup>2</sup> = 37.9% OF SITE AREA



# WEST COAST ROAD HOUSING DEVELOPMENT BULK & LOCATION STUDY



# Resource Consent Application Form

(Under Section 88 of the Resource Management Act 1991)



Send to: The Chief Executive  
Waitakere City Council  
Private Bag 93109  
Henderson  
WAITAKERE CITY 1231

For more information:  
Civic Centre, Waipareira Avenue,  
Henderson  
Telephone (09) 839 0400  
Facsimile (09) 836 8001

Office use only:	
Receipt Date:	26 JUN 2006
Initials:	
GEMs Number:	20061077
Date By:	20061078
Deposit Paid:	\$7785 -

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## 1. Applicant Details

1.1 Applicant: New Zealand Housing Foundation

Note: Agents acting on behalf of the applicant please do not put your name here.

1.2 Please ☒ tick the appropriate box

I am: ☒ The Owner ☐ Occupier  
☐ Lessee ☐ Prospective Purchaser of the property

1.3 The type of Resource Consent sought is: (☒ box)

☒ Land Use Consent ☒ Subdivision Consent ☐ Certificate of Compliance

1.4 Description of proposed activity and reasons for the application. List rules infringed:

(Please note that this is not your assessment of effect as required in Section 4.)

landuse & subdivision consent for a 77  
unit residential development.  
Refer Page 13 & 14 of AEE for  
list of rules infringed.

(Please provide a full description of your proposal. Please describe and quantify each infringement of the District Plan rules, e.g. build a new dwelling on a site less than 450 m<sup>2</sup>, infringe the HIRB control from the western boundary.)

If necessary provide further details on an attached sheet or describe fully on the assessment of effects report.

1.5 Names and addresses of owners and occupiers of the property (if other than the applicant):

Owner(s): New Zealand Howay Foundation

Occupier(s): \_\_\_\_\_

2.0 Location Details

2.1 Address of property: 423-429 West Coast Road, Glen Eden

2.2 Legal description: Lot: 2 & 3 DP: 339810 CT: 163628 & 163629

2.3 Type of Human Environment: living environment

2.4 Type of Natural Environment: restoration / riparian margin area

2.5 Building Consent Application number (if applicable): N/A

3.0 Additional Consents

3.1 The following additional Resource Consents are / are not (delete one) required and have / have not (delete one) been applied for: (✓ box)

<input type="checkbox"/> Water Permit	<input type="checkbox"/> Discharge Permit	<input type="checkbox"/> Subdivision Consent
<input type="checkbox"/> Land Use Consent (e.g. earthworks)	<input type="checkbox"/> Coastal Permit	_____
<input type="checkbox"/> Building Consent	<input checked="" type="checkbox"/> ARC Consent	_____

WCC-SPW number and RMA number

ABA: \_\_\_\_\_

Date of application: June 2006 Council: \_\_\_\_\_

4.0 Assessment of Effects

Provide an assessment of effects in accordance with the Fourth Schedule of the Act. (Describe the effect of the proposal on the environment (including neighbouring properties) and measures incorporated into the proposed activity to reduce effects to an acceptable level). For guidance on possible effects that may apply to your proposal, see the relevant District Plan Assessment Criteria for Resource Consents. Examples of adverse effects may include location, size and design of buildings, visual impacts, shading, flooding, erosion, instability, changes to contours, removal or alteration of landform and vegetation, traffic generation and parking impacts, noise, odour and contamination, hazardous facilities. You may need to get specialist consultant advice, e.g. geotechnical, flooding engineer, traffic consultant.

Note that for complex applications, specialist reports will be required.

5.0 Attachments

Attach all the additional information required to be included with this application. (Refer to the Resource Consent Application Check Sheet - Land Use and Subdivision, for a guide to the information to be submitted with your application.) List attachments:

Refer Enclosed AEE

## 6.0 Subdivision Application

\* As this is an application for subdivision consent, attach information that is sufficient to adequately define:

- (a) the position of all new boundaries; and
- (b) † the areas of all new allotments; and
- (c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips; and
- (d) the locations and areas of any existing esplanade reserves, esplanade strips and access strips; and
- (e) the locations and areas of land below mean high water springs of the sea, or of any part of the bed of a river or lake, to be vested in the Crown or local authority under Section 237A of the Resource Management Act 1991; and
- (f) the locations and areas of land to be set aside as new roads.
- (g) Show existing and new easements.
- (h) If the subdivision is to be staged, define the stages.

\* Delete if this is not an application for a subdivision consent.

† Delete if the subdivision involves a cross-lease, company lease or unit plan.

## 7.0 Authorisation

Signature of Applicant/Authorised Agent: 

Print name of Applicant/Authorised Agent: Matthew Paetz

If the named applicant is a company/trust please state your position/title and contact details: \_\_\_\_\_

I have authority to bind the company/trust: (Signature) \_\_\_\_\_

(Please attach a copy of the Authorising Documents for company/trusts)

Agent's (authorised to sign on behalf of Applicant) name and address:

Babbage Consultants Limited  
PO Box 2027 Auckland

Phone Number:

Business: 09 3799980

Home: \_\_\_\_\_

Mobile: 027 2838855

Fax: 09 3771170

Email: matthew.paetz

Address for service/correspondence (if different from above): \_\_\_\_\_

Phone Number:

Business: \_\_\_\_\_

Home: \_\_\_\_\_

Mobile: \_\_\_\_\_

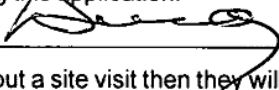
Fax: \_\_\_\_\_

Email: \_\_\_\_\_

## 8.0 Additional Application Requirements (please ✓ box)

- 8.1 Is the site contaminated or have there been chemical sprays stored or used on the site? (If yes, a contamination assessment may be required.) ☐ Yes ☒ No
- 8.2 Is there hazardous substances on the site? (If yes, provide a Hazard Facilities Screening Procedure.) ☐ Yes ☒ No
- 8.3 Has there been hazardous substances previously on the site? (If yes, provide a contamination assessment.) ☐ Yes ☒ No
- 8.4 Is there a locked gate or security system restricting access by Council staff? ☐ Yes ☒ No
- 8.5 Do you have a dog on the property that might worry the inspecting Council staff? ☐ Yes ☒ No
- 8.6 The processing of your Resource Consent will require a visit to the subject site by our planning staff. Please indicate ( box) whether you agree to our staff visiting the property or not.

☒ As land owner and with the consent of any occupiers, I agree to Council staff visiting the site(s) which is the subject of this application, for the purpose of assessing this application.

Land owner/s signature/s: 

**Note:** If our planning staff are unable to carry out a site visit then they will not be able to process your application.

## 9.0 Fees and Payment Details

- 9.1 A minimum base and monitoring fee payment is required on lodgement of all applications. Refer to the current Regulatory Fees & Charges Schedule.
- 9.2 Processing fees additional to the minimum base fee may be incurred if an application requires a hearing and/or any specialist inputs such as those related to drainage, infrastructure, landscape and visual amenity, traffic and parking matters and geotechnical issues. If the application is publicly notified and required a hearing the minimum hearing fee is to be paid before the hearing.
- 9.3 Such additional fees may be invoiced during or at the end of the application process, in accordance with Section 36 of the Resource Management Act 1991.
- 9.4 All fees (other than the minimum fee) shall be paid in full without set-off or deduction of any kind within 14 days of the date of the invoice or prior to the issue of the Resource Consent, whichever is the sooner.
- 9.5 The applicant shall further pay to the Waitakere City Council all costs and expenses (including costs on a solicitor/client basis and debt collector's cost) incurred in the enforcing or attempting to enforce these terms and conditions or in seeking payment of all fees.
- 9.6 Where you fail to make payment of any amount on the due date, Waitakere City Council may in addition require you to compensate it by making payment of interest as liquidated damages on the amount due from the due date for payment until the date of actual payment at a rate equal to the current overdraft interest rate Waitakere City Council has with its principal registered bank.

9.7 Applicants name and address for accounts: Matthew Paetz - Babbage Consultants  
PO Box 2027 Auckland

Business phone number: 09 379 9980

Home phone number: \_\_\_\_\_

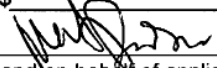
Mobile: 0272 838 855

Fax: 09 377 1170

Email: matthew.paetz@babbage.co.nz

GST number: \_\_\_\_\_

9.8 Minimum fee \$ \_\_\_\_\_ and monitoring fee \$ \_\_\_\_\_

9.9 Declaration   
Signed by /for and on behalf of applicant

Name: (print) Matthew Paetz

Position Senior Planner

Date: 21-6-06

This application **will not** be accepted by Council unless all the above required and appropriate information is provided (including the completed check sheet).

**Please contact the Call Centre 839-0400 with any queries regarding this form.**

- please allow adequate time for an initial review and site inspection (approx. 2 weeks) before you make enquiries concerning the progress of the processing of this application.
- please note your application may be rejected by council (within 5 working days) under section 88 of the resource management act if the information provided is inadequate.

# Resource Consent Application Check Sheet

## Land Use & Subdivision Consent



This form is intended as a guide to help you to ensure that all the required information is submitted with your application. Please complete this checklist and submit it with your application. Provide the level of information appropriate to the scale of the proposal.

Address: 423-429 West Coast Road, Glen Eden, Auckland.

Applicant: New Zealand Housing Foundation.

Application number RMA: \_\_\_\_\_ SPW: \_\_\_\_\_

### 1.0 Application form, plans and documentation

The information in this stage 1.1 to 1.8 is mandatory - failure to provide could mean your application is rejected. Other information should be provided relevant to this application.

**Tick** (Place a tick ✓ in the box if the item applies and has been addressed in the application)

**Reject**  
**tick**

- |                          |     |  |                                     |
|--------------------------|-----|--|-------------------------------------|
| <input type="checkbox"/> | 1.1 | Completed Application form, signed, name for Accounts supplied and, in the case of a trust or company, documentation to prove authority to sign provided.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.2 | 6 copies* (unbound) of application form, supporting information, assessment of effects, neighbours consents, certificates of title, supplementary reports and plans (refer 1.8 below) provided.<br>*(8 unbound copies required for a subdivision/LUC combo, 4 unbound copies for a Certificate of Compliance application, and only 4 copies of experts reports (eg, Geotech Traffic))  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.3 | 1 set of plans reduced to A3 or A4.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.4 | Current copy of Certificate of Title (not more than 6 months old).   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.5 | Full description of proposed activity.   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.6 | Full list of District Plan rules infringed and detail of infringement(s) quantified.   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.7 | A further assessment of any effects (AEE) that the proposed activity may have on the environment in accordance with the Fourth Schedule of the Resource Management Act (available from Council on request). (Note: For a Controlled Activity an assessment is not necessary unless specifically required in the District Plan.)  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 1.8 | Accurate plans A2 (A2 preferred size A3 are ok) sized to a recognised metric scale of 1:100 or 1:200. All plans should clearly show the name of the person and company that prepared the plans; address of property; the date that the plans were drawn and a unique plan reference or identification number and/or variation number where relevant. In addition the plans must provide (as appropriate) the following detail: | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (a) | north point (please orientate your plans so that north is at the top of the page)  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (b) | boundary dimensions and bearings, adjoining legal descriptions and street numbers, metric scale bar  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (c) | road boundary and name or names if it is a corner site   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (d) | location of vehicle crossing and any other street features such as footpaths, bus stops, on-street parking bays, median islands, street trees, street lights, power poles, traffic signals, signs, cesspits, underground services, public drains, edge of road carriageway and any designated road widening, fire hydrants, power and telephone plinths  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (e) | position and dimensions of existing buildings (including existing floor levels), eaves, height above driveways, floor plans, elevations  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (f) | position and dimensions of proposed buildings, decks, etc., with dimensions to boundaries  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (g) | floor plans  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (h) | full elevations of all building faces (Note: These should show proposed building materials and finished floor roof levels and extend full width of site where appropriate.)  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | (i) | position of existing and proposed drainage (public and private wastewater and stormwater) and water meters   | <input checked="" type="checkbox"/> |

Tick	(Place a tick ✓ in the box if the item applies and has been addressed in the application)	Reject tick
<input type="checkbox"/>	(j) position of existing and/or proposed vehicle access drive(s), clearance to the eaves of a building, passing bays, including details of drive construction, gradients, driveway inside turning radius, complying vehicle turning curves and (if the gradient is greater than 20%) also provide long and cross sections of the drive, define the width available between the building and boundary.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(k) position of existing and/or proposed car parks, including details of car park construction, gradients, dimensions, complying vehicle turning curves.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(l) any required outdoor space (provide dimensions and area in square metres)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(m) datum point for contours and/or spot heights (to LINZ Datum where practical)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(n) datum point, contours and spot heights, contours to extend across boundaries into adjoining sites and to the road.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(o) show height in relation to boundary planes on each building elevation and if necessary provide calculations (a brochure is available to assist with interpreting the height/boundary rules)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(p) show any flood plain and/or overland flowpaths, stormwater outlets to kerb	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(q) total site area and/or net unit areas (in square metres)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(r) total building coverage (in square metres)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(s) amount and location of impermeable (paved) surfaces	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(t) amount and location of earthworks (show areas of cut and fill plus provide long and cross sections, including for the building platform). Show where the earth is going.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(u) retaining walls details and finished ground and top of wall levels, slope of battering, identify if load bearing	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(v) location and species of existing trees plus the extent of their driplines and height. Define the boundary/ies of natural areas/trees.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(w) location of any proposed tree or vegetation clearance, including area of clearance in square metres, identification of any works within dripline of vegetation	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(x) location and type of proposed landscape planting including a planting plan and maintenance schedule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(y) location and type of existing and proposed fences	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(z) if the site adjoins a water course or body of tidal water, please identify Mean High Water Springs mark and/or the width of the bed of the water course and the extent of any Riparian Margin or Local Purpose (Esplanade) Reserve	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(z a) table of JOAL shares (subdivision only)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	(z b) show existing and proposed easements	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.9 For any tree/vegetation clearance or works which would affect any protected vegetation, please provide a report from an appropriately qualified and recognised Arborist or tree specialist.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.10 For any residential development within a Community or Working Environment please provide a report from a suitably qualified acoustic engineer to show that the part of the building to be used for the residential activity would be constructed to achieve a noise level inside any habitable room not exceeding 35 dBA L10 between the hours of 10 pm - 7 am.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.11 Optional photographs supporting the application, e.g. of the site, dwellings and buildings.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.12 Colour photographs and second-hand building inspection report for relocated building application.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.13 Written consent of affected parties (e.g. neighbours), this includes both owners and occupiers of properties and buildings where this is required. (Note: Where a property is in joint ownership, such as husband and wife, all landowners must sign. A copy of the plans shall also be signed by the owners and occupiers.)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.14 Copy of Transit NZ approval when site has access from a State Highway or Limited Access Road (eg SH16 or Hobsonville Road)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	1.15 Base application processing fee and monitoring fees.	<input checked="" type="checkbox"/>

## 2.0 City Wide Rules

In addition to the above please check whether any of the following City Wide Rules also apply to the application and if they do apply ensure that they are addressed in the application and appropriate detail is provided.

- |                          |  |                                     |
|--------------------------|--|-------------------------------------|
| <input type="checkbox"/> | 2.1 Natural Hazards - does the site contain unconsolidated fill or is it subject to inundation or in a stability sensitive area? If yes please provide stormwater catchment analysis reports, flood report and/or geotechnical assessment reports from appropriately qualified engineers. Provide proposed mitigation. | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 2.2 Hazardous facilities screening - does the proposal involve a process, use, transportation or storage of chemicals or other hazardous materials? If the answer is yes then please complete the Hazardous Facilities checklists and screening procedure.   | <input checked="" type="checkbox"/> |

**Tick** (Place a tick ✓ in the box if the item applies and has been addressed in the application)

**Reject  
tick**

- |                          |     |  |                                     |
|--------------------------|-----|--|-------------------------------------|
| <input type="checkbox"/> | 2.3 | Contaminated sites - is the site contaminated or have chemicals and sprays been used or stored on the site? E.g. has the site been used for an orchard, market garden, vineyard, glasshouse, service station or industrial site? If so please provide a report from an appropriately qualified consultant. This report should provide an assessment of the levels of contamination plus recommendations about remediation. | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 2.4 | General noise - is the site on a high noise route or within the Airbase noise control area? If yes, provide an acoustic report.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 2.5 | Heritage - does the proposal involve alterations, additions, relocation or the destruction of a heritage item?   | <input checked="" type="checkbox"/> |

### 3.0 Natural Area Rules

In addition to the above please check whether any of the following Natural Area Rules also apply to the application and if they do apply ensure that they are addressed in the application and appropriate detail is provided.

- |                          |     |   |                                     |
|--------------------------|-----|---|-------------------------------------|
| <input type="checkbox"/> | 3.1 | Any tree clearance/alteration/works within the dripline of protected vegetation.                                      | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 3.2 | Any earthworks (provide details as specified in 1.8(r) above).  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 3.3 | Impermeable surfaces – reticulated site.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 3.4 | Impermeable surfaces – non-reticulated site – provide a stormwater report from a suitably experienced engineer.       | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 3.5 | Development/Building within a riparian margin – may require an ecologist report and landscape mitigation report/plan. | <input checked="" type="checkbox"/> |

### 4.0 Human Environment Rules

In addition to the above please check whether any of the following Human Environment Rules also apply to the application and if they do apply ensure that they are addressed in the application and appropriate detail is provided.

- |                          |      |   |                                     |
|--------------------------|------|---|-------------------------------------|
| <input type="checkbox"/> | 4.1  | Sensitive ridge – visual assessment.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.2  | Density – visual assessment, infrastructure, traffic.                         | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.3  | Maximum height – provide visual assessment and shading diagram.               | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.4  | Height/boundary – shading diagrams showing impact on adjoining properties.    | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.5  | Yards.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.6  | Building Coverage.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.7  | Privacy/outlook – show position of adjoining houses.                          | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.8  | Outdoor space.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.9  | Parking and access – potential traffic, show vehicle tracking curves.         | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.10 | Shared drive – driveway details.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.11 | New vehicle crossing in Waitakere Ranges, Bush Living or Coastal Villages.    | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.12 | Second vehicle crossing.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.13 | Non-residential activity.   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.14 | Traffic generation – traffic consultant report.                               | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.15 | Noise – acoustic report.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.16 | Air discharge.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.17 | Odour/glare – lighting expert's assessment.                                   | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.18 | Signs – visual assessment.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.19 | Relocated building – second-hand building report.                             | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.20 | Infrastructure – engineering report.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.21 | Community Environment Building design rules.                                  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.22 | Landscaping – land plan.  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.23 | Residential Activities in Working or Community Environments.                  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | 4.24 | Medium Density Housing – traffic, visual, planners reports, landscaping, etc. | <input checked="" type="checkbox"/> |



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Waitakere City Council  
Private Bag 93 109  
Henderson

Job Number: 42608

MP

26 June 2006

Attention: Felicitas Dhliwayo

Dear Felicitas

**West Coast Rd (No. 423-429) – Land Use and Subdivision Consent application**

Please find enclosed an application for land use and subdivision consent at 423-429 West Coast Road, Glen Eden. The application is made by the New Zealand Housing Foundation for a 77 unit residential development.

Enclosed is the following information:

- Completed Resource Consent application form
- Cheque made out to Waitakere City Council for the advised deposit fee being \$7785.00
- Eight hard copies of the Assessment of Environmental Effects, which includes Certificates of title, Plans and expert reports

We trust that all the Council's information requirements have been met by this comprehensive application.

Should you require any clarification or further information, please contact the undersigned in the first instance on 027 283 8855, or by email on [matthew.paetz@babbage.co.nz](mailto:matthew.paetz@babbage.co.nz).

We look forward to working together with you in a positive fashion to achieve a positive outcome.

Yours faithfully

A handwritten signature in black ink, appearing to read "Matthew Paetz".

**Matthew Paetz**  
**Senior Planner**  
**Babbage Consultants Limited**



WEST COAST ROAD  
DEVELOPMENT  
RESOURCE CONSENT  
APPLICATION  
FOR  
NEW ZEALAND HOUSING  
FOUNDATION

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ASSESSMENT OF ENVIRONMENTAL  
EFFECTS

---

Report Prepared by:  
**Matthew Paetz, Senior Planner**  
**Bachelor of Arts / Bachelor of Planning (Honours)**  
**Full Member New Zealand Planning Institute**

Ref: 42608  
June 2006

Architects ■ Consulting Engineers ■ Surveyors ■ Project Managers

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Appendix 2:	Certificates of Title
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Appendix 4:	Architectural plans
Appendix 5:	Subdivision Plan
Appendix 6:	Earthworks Plan
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Appendix 8:	Services Plans
Appendix 9:	Traffic Assessment
Appendix 10:	Erosion and Sediment Control
Appendix 11:	ARC Comprehensive Discharge Consent
Appendix 12:	Engineering Calculations
Appendix 13:	Geotechnical Assessment
Appendix 14:	Iwi Consultation

## 1.0 INTRODUCTION

The New Zealand Housing Foundation (NZHF) proposes to develop the subject site, 423-429 West Coast Road, in a medium density residential configuration, comprising 77 units in detached, semi-detached, and apartment building forms.

Resource consent approval (land use and subdivision) is required from Waitakere City Council ("The Council"), for a **discretionary activity**.

This report provides an Assessment of Environmental Effects as required by the Fourth Schedule of the Resource Management Act 1991 (RMA).

The report is structured around:

- a description of NZHF's role;
- a description of the site and locality;
- a description of the proposed development;
- an assessment of the proposal against the Council's District Plan Provisions;
- an assessment of the environmental effects of the development; and
- a statutory assessment against Part II, Sections 93, 94 and 104 of the RMA

A number of additional supporting reports and plans form part of this application. These are listed in this report's table of contents and should be read in conjunction with this report.

## 2.0 NEW ZEALAND HOUSING FOUNDATION'S ROLE AND THE PROPOSED DEVELOPMENT

The New Zealand Housing Foundation (NZHF) is a charitable trust which provides support and empowers communities. Established in 2002, the Foundation was set up in response to the extremely limited community-based social housing sector and to address issues emerging in the New Zealand housing system around an aging population who have very few affordable housing options, and low income affordable home ownership. Additionally The Foundation enables low income families, some with special needs, the chance to own their own home or secure longer term tenure. The Foundation is supported by the Tindall Foundation and receives funding from Housing New Zealand Corporation and ASB Bank.

NZHF leverages housing outcomes through shaping policy, forming partnerships with community housing providers (both in the Public and Private sectors), and supporting projects that specifically target people on low to moderate incomes and those that are under housing stress. Promotion of community ownership of the projects inspires and empowers communities resulting in the development of neighbourhoods that are healthy places in which to live and where people take responsibility for themselves and others in the community. NZHF acknowledges that community development and renewal initiatives are especially important in Iwi communities and public housing estates that have become dysfunctional and through partnerships and leveraging creates 'real' housing outcomes which benefit these communities.

To date, The Foundation has achieved a number of successful projects including:

- Housing for the elderly eg. Abbeyfield programmes
- The provision of a home ownership programme for Pacific Island people in Wellington
- A new shared equity home ownership programme has commenced in South Auckland with 4 homes occupied
- Large community homes (x5) have been developed in Auckland for community group service providers catering for the disabled, street kids and those with mental health problems
- Trusts in Tauranga, North Shore, Coromandel and Nelson have been assisted to become housing providers

Many New Zealander's still aspire to own their own homes however home ownership rates are projected to continue to fall due to reduced affordability in face of rapidly appreciating house prices. Targeted at households wanting to achieve home ownership but lacking the deposit, the home equity programme creates affordable entry level home ownership and changes home ownership from a dream into a reality for families.

### 3.0 THE WEST COAST ROAD PROJECT

The project is an Integrated Community Housing Development on NZHF-owned land, with the following objectives:

Create a housing environment that provides:

- Affordable entry level home ownership
- Rental housing dispersed to meet diverse range of needs
- Sustainable and eco / environmental features
- Conventional construction / quality housing / low building cost

Participation of Key Stakeholders:

- NZHF Home Equity Programme
- Community Housing Providers (Habitat For Humanity plus others)
- WCC plus other regulatory authorities
- Beacon
- Funders (HNZC /ASB)

Demonstration Project that delivers:

- Public/Private/Community Partnership
- Affordable housing options for low income people
- Efficient regulatory and consent approval process

## 4.0 SITE DESCRIPTION

### 4.1 LOCALITY

The neighbourhood character is varied containing a mix of land use activities within 400 metres of the site, including developed and undeveloped residential land, open space developed for active and passive recreation, undeveloped open space, Marae, school, dairy and fruit and vegetable shops, commercial use. This range of services and amenities provides an excellent location within which a medium density development such as proposed should be situated.

The surrounding neighbourhood contains a mix of housing styles, including medium density terraced housing, free-standing town houses on sites generally ranging between 350m<sup>2</sup> and 450m<sup>2</sup> (i.e. Woodbank Drive development), and conventional house and garden development where the site areas are in excess of 600m<sup>2</sup> (i.e. West Coast Road).

A **Locality Plan** of the site is attached as **Appendix 1**.

### 4.2 DEVELOPMENT SITE

The development site is located on West Coast Road, Glen Eden, in close proximity to the intersection of that road with Woodbank Drive. The site has legal frontage to four roads – West Coast Road, Pyramid Place, Titch Place and Woodbank Drive. The official street address for the site is “423-429 West Coast Road”.

The site comprises Lots 2 and 3 DP 339810. **Certificates of Title** for the site are attached in **Appendix 2**.

The site is an area of 5.7348 hectares, and is of an irregular shape, which is largely a result of the topographical characteristics of the locality, in particular the location and route of the watercourse (Parrs Stream) running through the site roughly in a meandering north-south direction. To the south of Pyramid Road there is a row of mature pine trees running from east to west.

In the southern portions of the site the land is gently sloping downwards from east to west, towards the stream channel and associated riparian margins, before sloping upwards from the stream channel to the western site boundary. The land to the north of Pyramid Place on the site becomes steeper as part of the site drops quite steeply into a gully towards the stream. The west side of the site is moderately steep.

The larger area at the north end of the site is relatively flat with a gentle slope down to the stream.

The site is presently covered in overgrown grass, weeds, gorse and trees. There is a mixture of native and exotic trees, predominantly located around the edge of the stream and at the northern boundary.

The area has a new subdivision on its western boundary which has the roading network laid and the construction of some houses has commenced. A more mature subdivision borders the site on the eastern side.

There are no structures currently on the site.

Photos depicting the character of the site and surrounding area are attached as Appendix 3.

## 5.0 PROPOSAL

### 5.1 BUILDING DESIGNS

The proposal comprises the construction of 77 new units, as shown in the plans attached as Appendix 4.

A range of building typologies are proposed. This ensures a diverse housing mix.

These typologies are summarised as follows:

- Four 2-bed units, in a detached form, with single carports
- Eighteen 2-bed apartment units
- Thirteen 3-bedroom detached houses with single garages
- Twenty-eight 4-bedroom detached houses with double garages
- Six 4-bedroom houses with single garages
- Eight 5-bedroom houses with double garages

Key internal features of the designs include:

- Twinned living areas with double aspect, allowing for flexible use, which takes into account Pacific and Maori cultural needs.
- Good internal and external storage facilities
- The ability to create open plan spaces
- Good wheelchair access with flush thresholds
- Ground floor shower / bathroom
- Indoor / outdoor spaces well connected through the use of external hard and soft landscaping

### 5.2 ALLOTMENT SIZES / CONFIGURATIONS

The proposal is to create 61 residential allotments in conjunction with joint owned access lots, and road and drainage reserve to vest in Waitakere City Council. Over the 61 allotments, 77 units are proposed, with 14 apartment units on Lot 61 in Stage 3 being unit titled as well as 4 apartment units on Lot 56 being unit titled.

All allotments have been designed to comply with Council's subdivision standards.

Refer to the subdivision plans attached as Appendix 5.

### 5.3 ARCHITECT'S DESIGN STATEMENT

Jane Arnott, Senior Architect at Babbage, provides the following design statement:

*The Foundation is looking to develop cost effective, simple, two storey housing types on small sections, with medium-to-long term joint ownership with the home buyer. This means long term maintenance, and later resale value are important to the success of the development. For this reason sustainability and energy efficiency measures are being investigated and priced as part of the project.*

*The site plan is long and thin, following the course of a feeder stream from the Waikumete approximately orientated south to north axis. As a consequence the main feature of the site is the natural reserve (riparian margin) of the stream.*

*At present, this reserve contains some valuable native trees and many weed species. It is proposed (refer to the Landscape Designer's assessment) to renovate and enhance this area with appropriate planting, a pathway and bridge crossing to create neighbourhood links and an esplanade effect throughout the site. This creates a very pleasant green backdrop and outlook for our proposed residential development, with most houses oriented to take advantage of both views and sun.*

*The site has been divided into three stages according to the natural breaks in the landscape. Stages 1 and 2 are on the east side of the stream, backing onto an existing low level residential development to the east. These two stages are separated by a narrow pinch point in the site.*

*Stage 3 is on the opposite (west) side of the stream from Stage 2. It affords a view of the stream reserve and storm water pond to the east, and backs on to a relatively intensively developed group of town houses to the west – some three and four storey. Stage 3 is therefore a more intensive development in response, with two and three levels of apartments with undercroft car parking.*

*All three stages have a significant natural contour difference running on the east-west axis to the lowest point in the stream bed. This means that even houses at the furthest distance from the stream should get a view of the larger feature trees, or the north end wetland planting in the reserve.*

*The materials of the houses will be mainly concrete slab foundations (where grade permits), timber weatherboard, masonry cladding, powder coated aluminium windows, and colorsteel roofs. The investigation is still on-going into services such as water and space heating, but wherever possible the houses are oriented to maximise useful solar exposure to living spaces and roofs.*

*The above factors have all contributed to the type, mix and inter-relationship of the houses. The layout has been further influenced by urban design and streetscape issues.*

*Each house has a hierarchy of private to public spaces defined by walls, sun & street orientation, landscape contour and landscape planting. Generally house*

*platforms are maintained at one level with any change of level happening at the boundaries. Level changes are kept as short as possible, 1.2m being the target maximum. In the case of Stage 2, the roadway has been split into two levels to achieve the short steps. The apartment buildings are sited on the steeper gradients, where they are set into the hillside with car parking underneath and usable outdoor living space on the upper ground level.*

*Wherever possible there is good oversight of the street from the kitchen or living area. Street trees (approximately one per house) create soft edges and screening from the western sun. Street edge walls are masonry and low, and where used, provide a good public/private threshold. Garages are usually set back slightly from the main house, with optional pergolas providing a further screen. Where house boundaries adjoin the stream reserve, oversight and privacy are in balance. A planted out open fence and a level difference (bank) will allow oversight of the path with a level of screening for privacy.*

*The style of the housing is very simple (as it needs to be for cost reasons), relying on simple detailing and good materials to update traditional gable and skillion roof form silhouettes, which is in keeping with much of the old housing stock in the area - though not the parapet style or hip roofs of the newer adjoining properties. This is a deliberate departure.*

*In most houses, living areas are on grade with access to the yard, bedrooms are upstairs with views to the neighbourhood. The footprint is minimised to maximise yard space, as most of these houses will be family homes.*

*Cut-outs in the building forms provide porch shelter and shelter for some living area doors. The palette is mostly natural greys, browns and greens with the occasion splash of colour to liven things up.*

*This development is a mix of apartments, senior units and houses and is intended to produce a mixed community with a well developed streetscape which allows good aesthetic values and security/oversight.*

## **5.4 SUSTAINABLE DESIGN**

### **5.4.1 Introduction**

A sustainable future relies on reducing CO2 emissions. At West Coast Road this means maximizing energy efficiency, considering the use of renewable and sustainable building materials and making provision for water conservation.

### **5.4.2 Energy efficiency and passive solar design**

*Buildings are orientated North for maximum solar gain, good day-lighting and heat storage. Good natural daylight is essential for reducing the need for artificial light and reducing energy consumption. To prevent overheating in the summer months shading is provided by pergolas, eaves overhangs and planting. Energy efficiency is achieved, by using energy efficient light fittings, appliances, good levels of insulation [to exceed current Building Code] and good quality aluminium windows with the provision of upgraded glass specifications, with the possibility of double glazing being utilised. Provision within the design has also been made for the introduction of passive ventilation. This is achieved through background ventilation via window air vents, and the*

use of a roof 'Wirly' vent which will expel moisture and unwanted heat, whilst drawing in fresh air.

Hot water and space heating are the biggest uses of energy in the home. Solar radiation is free, non-polluting and renewable. It is proposed to make provision for solar water heating, which consists of a solar collector and a hot water cylinder which can be accommodated on the roof of each dwelling. These systems have an electrical or gas back up when the sun is intermittent. Standard solar water heaters can produce around 75% of a household's water supply in the summer and between 25% - 45% in winter.

#### **5.4.3 Construction materials**

Materials have been selected to ensure durability, and where possible from sustainable sources. Identifying and selecting ecological materials involves detailed research in order to establish 'best selection' each product can be selected by considering the following:

- Recycled or recyclable
- Sourced locally
- Long lasting
- Non-toxic
- From renewable source

For West Coast Road we have prepared a building material matrix to assist the developer in making the best choice, to achieve the best value.

#### **5.4.4 Water Conservation**

To reduce water use and stormwater run off the following provisions have been proposed:

- Rainwater harvesting from roof areas, with on site storage
- No in-sink waste disposal unit to kitchen
- Low flow shower heads and low volume flush toilets
- Native and low water planting with no built in irrigation system
- Option for Grey water recycling for use in toilets and gardens

#### **5.4.5 Land Use**

The scheme development plan also integrates the existing stream to the North and the introduction of a new wetland to the North-East. This combination of water, plant and animal life together with the natural characteristics of the landscape lends itself to a sustainable habitat.

The key principals are to:

- Create positive relationships between all elements in the localised environment
- Allow rainwater to replenish the water table
- Introduce elements such as trees to perform multi functions such as shading, habitat etc.
- Use local native plants that need little care and maintenance
- Create useful microclimates
- Companion planting to reduce need for spraying

- Omit use of pesticides

## 5.5 EARTHWORKS

Earthworks to accommodate the proposed dwellings have been designed and are shown on the enclosed drawings in **Appendix 6**. Some retaining walls are required to produce usable building platforms, generally less than 1.5 metres in height. Earthworks embankments are proposed at the interface with the existing stream to accommodate both usable building platforms and necessary elevation separation for the 100 year flood level of the stream.

Earthworks operations are to be generally cut to fill operations with some retaining wall structures required between the residential lots.

Cut to fill operations are generally between Stages 1 and 2 with Stage 1 providing the majority of cut material to be carted into Stage 2 to create fill platforms and embankments. Stripping of topsoil and vegetation removal from the earthwork areas is required and it is anticipated that removal from site of excess topsoil and organic unsuitable material will also be required. Limited earthworks within the 100 year flood plain is required for construction of the wetland stormwater treatment facilities on the northern portion of the site. The volume of earthworks (cut to fill) operations is estimated to be in the order of 40,000 cubic metres. Earthwork operations on Stage 3 of the development is anticipated to be a balanced cut fill dependant on the volume of unsuitable material encountered.

There are two main types of retaining walls for the construction. The retaining walls proposed on the property boundaries are anticipated to be timber pole type walls. The low walls, typically 0.5 metres high on the boundary between the properties and the road frontage are to be of a key stone variety.

The timber retaining walls are generally positioned between individual residential lots or on the existing property boundary to create the necessary building platforms. Where the proposed dwelling is a unit title type dwelling there will be internal retaining to facilitate the elevation difference between floors.

All retaining structures greater than 1 metre in height will have appropriate safety measures installed.

## 5.6 SITE LAYOUT AND ACCESS

The proposed site plan is structure around four access connections – via West Coast Road, Pyramid Place, Titch Place and Woodbank Drive

Cul-de-sacs are proposed off West Coast Road and Pyramid Place, whilst the accessways coming off Titch Place and Woodbank Drive are connected allowing for circulation around the northern portions of the development.

The roading, where possible, has been designed to work “with” the contours rather than “against” the contours.

The access roads to Stages 1 and 2 are generally to local subdivision standards with carriageway widths between 6 metres and 7.5 metres with associated services berms and footpaths. The roading network for the development contains residential roads with a general carriageway width of 5.5 metres with some sections of road accommodating parallel parking bays of 2.50 metre widths. All roads within the development have footpaths adjacent to the kerbline of 1.50 metres width and a service berm of 2.0 metres. The roads within the development have been sized in accordance with Waitakere City Council's "Developers Design Guide for Residential Subdivision and Medium Density Housing".

Visitor carparking is proposed at various locations within the road reserve. In total, 40 visitor parking spaces are proposed, which is in excess of the Council's standards.

Other elements of the proposal include:

- All streets are well overlooked from kitchens or living areas with direct access to front doors.
- All houses have road frontage, with no rear lot development.
- A range of housing typologies are provided, with bigger houses on larger sites.
- Large amounts of secure, private open space are provided.
- The dwellings have been orientated, as much as practical, to face towards the north, maximising daylight/sunlight admission.

## 5.7 CONSTRUCTION

### Construction

The table below sets out the External Specification for the units.

Item	Description/Specification
Super-Structure	<ul style="list-style-type: none"> <li>• Timber frame, Kiln dried timber framing H3.2 borc treated radiata pine</li> </ul>
External Cladding Envelope	<ul style="list-style-type: none"> <li>▪ Timber weatherboard radiata pine H3.2, shiplap detail, laid horizontally and vertical rusticated boards on batten/cavity</li> <li>▪ Architectural masonry veneer split face, fair face.</li> </ul>
Insulation	<ul style="list-style-type: none"> <li>▪ Woolbloc or pink batts to achieve R 2.6</li> </ul>

Roof Cladding	<ul style="list-style-type: none"> <li>▪ Long run steel roof with Colorsteel finish. Profile to be corrugated or Trimdek.</li> </ul>
Insulation	<ul style="list-style-type: none"> <li>▪ Woolbloc or pink batts to achieve R 3.6</li> </ul>
Ground Floor System	<ul style="list-style-type: none"> <li>▪ Ribraft or similar to approval</li> </ul>
Windows	<ul style="list-style-type: none"> <li>▪ Aluminium frames with powder coated finish. Windows to be thermally separated and have vent grills, for background ventilation.</li> <li>▪ Window hardware – Satin aluminium</li> </ul>
External entry door	<ul style="list-style-type: none"> <li>▪ Aluminium frame with timber door. External quality timber required for door.</li> </ul>
Other external doors	<ul style="list-style-type: none"> <li>▪ Aluminium frames with single glazing 6.38mm laminate and 4mm float.</li> <li>▪ Hardware to be in stainless steel.</li> </ul>
Garage Doors	<ul style="list-style-type: none"> <li>▪ Pre-painted galvanised steel/timber sectional overhead type.</li> </ul>
External balustrades/handrails	<ul style="list-style-type: none"> <li>▪ Galvanised powder coated steel with pressed steel flashings to suit.</li> </ul>
Guttering and Fascia	<ul style="list-style-type: none"> <li>▪ Pre-finished steel.</li> <li>▪ Colorflo rainwater system box gutter 125mmx125mm in colorsteel finish, with matching fascia</li> </ul>
Soffits	<ul style="list-style-type: none"> <li>▪ Fibre cement panel</li> </ul>
Downpipes	<ul style="list-style-type: none"> <li>▪ UPVC</li> </ul>
Mowing strip	<ul style="list-style-type: none"> <li>▪ Concrete pavers</li> </ul>
Fencing	<ul style="list-style-type: none"> <li>▪ 1.8m high close boarded fencing and pool type fencing.</li> </ul>
Driveway and patio	<ul style="list-style-type: none"> <li>▪ Concrete with exposed aggregate</li> </ul>
Planting	<ul style="list-style-type: none"> <li>▪ Natives common to local area</li> </ul>

**Provision for sustainable features**

Rainwater tanks	<ul style="list-style-type: none"> <li>▪ Rotational moulded plastic</li> </ul>
Solar hot water heating system	<ul style="list-style-type: none"> <li>▪ Roof mounted solar panels with mains pressure cylinder</li> </ul>
Double Glazing	
Low flow reticulation devices	

**5.8 TREE / VEGETATION REMOVAL**

The Arborist's Report attached in **Appendix 7** specifically identifies the trees and vegetation that requires removal to facilitate the proposed development. It also identifies trees and vegetation to be retained.

**5.9 PROPOSED LANDSCAPING**

A **Landscape Plan** is attached as **Appendix 7**.

There will be substantial new tree planting to streets, reserves and front gardens. In reserve areas, particularly along the margins of the stream, this will be native re-vegetation. In streets and private gardens exotic ornamentals and deciduous street trees will be planted, in keeping with the suburban character.

In all, there will be a substantial increase in the vegetation especially trees and shrubs on the site although this will be concentrated along the stream in the reserve and to the street frontage of the houses.

**5.10 FENCING**

The rear yards and gardens will be fully fenced to 1.8m for "stand up" privacy. Side boundary fences will be 1.35m tall for "sit down" privacy and the front boundaries will be defined either by retaining walls and planting, or by 0.8m fencing and low planting. These fences will be of a sturdy "trellis type" combined with vines to give privacy for outdoor living areas.

The fencing adjacent to the reserve and stormwater ponds will be standard metal "pool type" fencing combined with planting for visual amelioration. This fencing will allow visual surveillance of adjacent reserve areas from houses and gardens. At the same time low to medium planting around the fences will integrate them into the landscape.

### **5.11 SANITARY SEWER RETICULATION**

All properties will be connected to the primary wastewater reticulation pipelines, as shown on the enclosed drawings in **Appendix 8**.

All the development's wastewater will gravitate to connection points on the existing Waitakere City Council pipeline. As the surrounding properties consist of new residential development already connected to the public wastewater network, and considering the site will be a stand-alone comprehensive development, it is not anticipated that any future connection to the proposed reticulation network will be necessary. Therefore the reticulation network will be sized for the wastewater flow generation from this development only. The minimum approved diameter for public wastewater pipelines will be adequate to convey these flows.

Pipe materials and connections to individual properties for the proposed wastewater reticulation will be specified to Waitakere City Council design standards.

As shown on the drawings, portions of the Waitakere City Council existing reticulation will require realignment. Approval in principle for realignment of the sewer has been given by Ecowater with the new alignment to be approved at the time of Engineering Approval.

### **5.12 WATER SUPPLY**

Water supply connection for the development will be sourced from adjacent reticulation layout in West Coast Road, Woodbank Drive, Titch Place and Pyramid Place.

A fire main laid within the subdivision roading network will provide fire fighting services with hydrants to be spaced according to Waitakere City Council standards.

All water supply construction materials and fittings will be to approved Waitakere City Council standards.

### **5.13 UTILITY SERVICES**

Confirmation has been received from Vector Energy that there is adequate existing electricity supply for the proposed development from the surrounding residential reticulation.

Telecommunication services will be extended from the existing services off West Coast Road, Woodbank Drive, Titch Place and Pyramid Place. Final details for the reticulation and connection points will be agreed with the service provider on detailed design.

There is existing gas reticulation within the area. Allowance for gas reticulation has been made within the development as shown on the drawings.

#### **5.14 FOOTBRIDGE**

A footbridge is proposed to allow pedestrian access from the adjacent Albionvale Road subdivision to the West Coast Road Housing Development.

The access point in the West Coast Road Housing Development will be to the stream edge pathway in the vicinity of the northern end of Road 3 crossing to the reserve on the other side of the stream.

The bridge will be based upon a Waitakere City Council preferred design of appropriately treated glulam supporting beams with galvanised steel handrails.

The bridge will span seven metres with no need for intermediate supports within the watercourse. Detail design will be provided at engineering approval stage.

#### **5.15 LIGHTING**

Street and amenity lighting will be provided for the development to Council standards and approval. The lighting forms used will be in keeping and complimentary to the development's modern architecture.

### **6.0 WAITAKERE CITY DISTRICT PLAN**

#### **6.1 RULES**

The subject site is zoned:

- Living Environment
- General Natural Area
- Restoration Natural Area
- Riparian Margin Natural Area
- Non-Riparian Stream

under the Operative Waitakere City District Plan.

The following consents are required:

- Discretionary Activity consent for the establishment of a 77 unit medium density housing development not meeting the District Plan limited discretionary location criteria (Rule 2.3 - Living Environment).
- Discretionary Activity consent for the infringement of the height in relation to boundary control between sites within the development (Rule 5.3 - Living Environment). The extent of these infringements are shown visually in Appendix 4.
- Discretionary Activity consent for the infringement to the maximum building height control on the apartments demarcated as Building types "2B" and "2A" on the site plan (Rule 4.1 – Living Environment). The extent of these infringements are as follows:

- 4 level apartment Type "2B"  
Maximum extent of infringement = 3.960m (eastern façade)  
Minimum extent of infringement = 1.095m (western façade)
  - Northern-most 3 level apartment Type "2A"  
Maximum extent of infringement = 115mm (eastern façade)
  - Southern-most 3 level apartment Type "2A"  
Maximum extent of infringement = 1.010m (eastern façade)
- Limited Discretionary Activity consent for the infringement of the impermeable surface control on all Lots (Rule 4.2 - General Natural Area: 15% maximum impermeable surface control where a site does not have connections to a reticulated system).
  - Discretionary Activity consent for earthworks associated with a subdivision classified as a Discretionary Activity in the Subdivision Rules, not meeting the earthworks standards in Rule 3.1, 3.2 or 3.3 of the General Natural Area (Rule 3.4 - General Natural Area).
  - Controlled Activity consent for the clearance of exotic and native vegetation less than 6 metres in height and/or 600mm in girth and vegetation listed within the Removable Vegetation Appendix and Environmentally Damaging Plants Appendix, to a total cleared area greater than 500m<sup>2</sup> within the General Natural Area (Rule 2.2 - General Natural Area).
  - Limited Discretionary Activity consent for the clearance of exotic and native vegetation in excess of 6 metres in height and/or 600mm in girth within the General Natural Area (Rule 2.3 - General Natural Area).

Overall, the application is a **discretionary activity**.

## 6.2 OBJECTIVES AND POLICIES

A range of broad policies and objectives are contained within the District Plan and provide a statement of the Plan's approach to the management of the effects on natural and physical resources. The Policy Section of the District Plan identifies the significant resource management issues of the District; the objectives sought by the Plan and the policy direction chosen in response to these issues and objectives.

The objectives and policies identified within the District Plan as having particular relevance to the development proposal are as follows:

- Residential Activities/Density  
Objectives: 1-4, 10, 11  
Policies: 1.1, 1.2, 1.14, 2.1, 3.1, 4.2, 10.17, 10.27, 11.1, 11.2, 11.27, 11.28
- Height in Relation to Boundary  
Objectives: 1, 10, 11  
Policies: 1.15, 10.5, 10.6, 11.3

- Impermeable Surfaces  
Objectives: 1, 2, 5, 7-10  
Policies: 1.5, 1.6, 1.7, 1.10, 2.10, 5.1, 7.2, 7.3, 8.4, 9.6, 9.7, 9.12, 9.14, 10.27
- Subdivision  
Objectives: 1-12  
Policies: 1.1, 1.10, 1.14, 1.15, 1.20, 2.1, 2.3, 2.13, 3.1, 3.4, 3.5, 4.2, 4.3, 4.4, 5.2, 5.4, 6.1, 6.4, 7.1, 7.2, 7.3, 8.3, 8.5, 9.1, 9.3, 9.6, 9.7, 9.14, 10.4, 10.7, 10.8, 10.9, 10.13, 10.15, 10.16, 10.17, 10.18, 10.20, 10.22, 10.23, 10.27, 11.1, 11.2, 11.4, 11.5, 11.6, 11.9, 12.4, 12.8
- Earthworks  
Objectives: 1-3, 5-11  
Policies: 1.1, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.12, 1.14, 1.16, 1.19, 1.20, 2.4, 2.8, 2.10, 3.2, 3.4, 3.5, 5.1, 5.4, 6.2, 6.3, 7.2, 7.3, 7.5, 7.7, 8.1, 8.4, 8.6, 8.7, 9.6, 9.7, 9.10, 9.11, 9.12, 9.14, 10.13, 10.27, 11.2, 11.4, 11.7
- Vegetation Alteration  
Objectives: 1-3, 5-12  
Policies: 1.1, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.16, 1.19, 1.20, 2.3, 2.4, 2.11, 2.12, 2.13, 3.2, 5.1, 5.2, 5.3, 5.4, 5.7, 6.2, 7.3, 7.4, 7.7, 8.1, 8.2, 8.4, 8.8, 9.9, 9.10, 9.11, 9.13, 9.14, 10.27, 11.2, 11.4, 11.7, 12.1, 12.6, 12.7

The proposal is considered to be generally consistent with the policy framework provided in the above quoted provisions.

In summary:

- The proposal adheres to the principles of good urban design and contributes to housing diversity and choice
- Good amenity will be provided for the future residents of the development, in terms of private and useable open space, and adequate access to daylight
- The amenity of neighbouring properties will be maintained and even enhanced, by converting a presently neglected and messy site into an integrated, architecturally designed residential development with substantial revegetation.
- The proposal seeks to minimise impacts on the natural environment through the use of appropriate sediment and erosion control measures during construction, and stormwater treatment measures such as swales and stormwater treatment ponds
- Removal of vegetation is minimised
- A comprehensive landscaping plan is proposed which will help soften and "ground" the new built development, whilst enhancing the riparian margins of the natural environment alongside the stream

- Sustainability and energy efficiency has formed a central consideration in the progression of the design

### 6.3 ASSESSMENT CRITERIA

General assessment criteria are specified in Section 13.14 of the District Plan. Given the generality of these criteria, and the fact that these matters have been dealt with elsewhere in this assessment, for brevity the assessment criteria are not listed here.

However as demonstrated elsewhere in this report, the proposal is considered to satisfy and even exceed these criteria.

### 6.4 MEDIUM DENSITY HOUSING CRITERIA

Reference has been made to the Council's Medium Density Housing Criteria in the District Plan. Whilst these criteria are specifically designed to be utilised in the assessment of applications qualifying as "medium density developments", it is considered that these criteria are also relevant to a development of the scale and intensity proposed herein.

The criteria are grouped into the following Design Elements, with brief commentaries:

#### ***Neighbourhood Character***

*Relationship of the development to the surrounding neighbourhood and streetscape.*

Comment:

The density of the proposed development is generally consistent with that of the surrounding neighbourhood. The higher density element of the proposal in Stage 3, comprising apartment blocks, is located closer to the western boundary, which adjoins a recent medium density development which utilises terrace housing as a predominant built form. The location of these buildings helps ensure a transition occurs between the higher density development on this neighbouring site, and the subject site "proper".

#### ***Site Layout***

*Overall design, character and landscape treatment, including such things as orientation, site access, location and function of outdoor spaces, topography and views.*

Comment:

The design of the development has been undertaken comprehensively, to ensure integration in design between the various building stages. Such a comprehensive approach also ensures consistency and unity in architectural design and style, notwithstanding the objective of allowing for variety.

Building orientations are generally north / north-west-facing to maximise sunlight. At the same time, this also allows for maximisation of views and outlook towards the stream area of the site.

**Building Location**

*Relationship to adjacent buildings, site boundaries and height of the proposed development to ensure satisfactory amenity is maintained.*

Comment: Relationships between proposed buildings in the development have been carefully considered to ensure critical issues such as daylight admission, outlook and privacy are addressed. This has been achieved through placement of units within allotments, orientation of buildings, and placement of windows.

Also of note is the fact that the lower density development is generally located towards the eastern boundary of the site, which adjoins existing low density suburban development, whilst the higher density apartment development is located towards the western boundary of the site which adjoins a higher density residential subdivision.

The majority of the proposed development is single or double storied, of typical suburban scale. The exception is the apartment buildings in stage 3, which comprise 3 and 4 level buildings. However, importantly, as the ground level parking in these buildings is cut into the slope, these buildings will present as 2 and 3 storied structures to the neighbouring properties to the west.

**Visual and Acoustic Privacy**

*Layout, and screening to enable privacy from overlooking or unwanted noise.*

Comment: Zero-lot boundaries are generally provided on the southern boundaries, where the southern elevations of the dwellings present a largely "windowless" façade. This protects the privacy of the north facing outdoor yards of the adjoining properties to the south. Such design techniques also help provide for acoustic privacy, by physically separating the internal and outdoor living areas of adjoining units.

**Carparking and Vehicle Access**

*Design and layout of driveways for resident and visitor car parking to achieve convenient, safe and attractive vehicle access.*

Comment: All access and parking areas have been designed in accordance with Council standards, so ensure safe, convenient and efficient access. To enhance urban design outcomes, driveways from dwellings to the road have been "tapered" to reduce width of vehicle crossings at the street frontage.

Visitor parking has been provided which exceeds Council requirements.

**On-site Outdoor Space**

*Relationship of outdoor space to houses to enable appropriate levels of privacy, outlook, sunlight and landscape treatment, while also considering maintenance, management, and security.*

Comment: Outdoor yards are generally provided on the northern sides of the dwellings. Privacy between units has been addressed above.

**Entries to Buildings**

*Design and layout to achieve identity and visibility, shelter, security and potential for disabled persons access.*

Comment: Front doors have been designed and located to ensure maximisation of the above qualities. For most dwellings, entrances are clearly visible from the street. This is achieved through placement of the front doors generally to the front of dwellings, together with the provision of low (0.8m) fencing and landscaping on the front boundary.

**Site Facilities**

*Appropriate location and design of shared facilities for rubbish collection, service connection points, storage and the like.*

Comment: Rubbish will be collected from individual properties rather than from a shared facility.

**Landscape Treatment**

*Potential for landscape design to enhance and integrate the development into the surrounding neighbourhood, and create a quality living environment.*

Comment: A comprehensive landscape design has been completed by a designer with significant expertise and experience in Waitakere City. The design is fully cognisant of Council's requirements, particularly with regard to the requirements for riparian planting.

## **7.0 AUCKLAND REGIONAL COUNCIL**

### **7.1 REGIONAL PLANS**

The earthworks proposed necessitate resource consent approvals under the Auckland Regional Plan: Sediment Control 2001.

Applications to that Council have been made concurrently.

### **7.2 AUCKLAND REGIONAL POLICY STATEMENT (ARPS)**

Following the passing of the Local Government (Auckland) Amendment Act 2004, the ARPS was amended to reinforce urban growth management in the Auckland Region and the integration of land use planning and transport infrastructure.

Revised Section 2.3 of the ARPS states:

*"Key features of the "Growth Concept" are that :*

- *growth will be managed by promoting **quality, compact urban environments (intensification)**.*
- *most growth is **contained** within the existing metropolitan area with development outside current urban limits only where environmental, accessibility and community principles can be met;*
- *most urban growth is focused **around town centres and major transport routes** (refer Schedule 1) to create higher density communities, with a variety of housing, jobs, services, recreational and other activities (mixed use);*
- *there is much less emphasis on accommodating growth through general infill in suburban areas.*

The proposed development is generally consistent with these principles, as it represents a well planned, comprehensive development of a compact nature located within the existing metropolitan area.

## 8.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

### 8.1 VISUAL IMPACT AND CHARACTER

The majority of the subject site will be developed with low-medium density detached housing, generally consistent with the intensity anticipated by the District Plan. Stage 3 of the project is characterised by medium density apartment accommodation.

A visual impact assessment has been prepared by SOUL Landscape Architects and is attached as **Appendix 7**.

The assessment concludes:

*The landscape of suburban living areas in such as this part of Waitakere is presently changing to accommodate medium density infill housing and create a landscape that is more urban in character. The proposed re-development of the site is in keeping with this trend and is in character with the surrounding areas. Little of specific visual merit will be lost from the site and the gains of new planting and public access and habitat restoration will be significant.*

*The modest but thoughtful quality of the architectural design will offer visual benefits by comparison with the present rather run-down site character.*

***Overall, the change in visual character and habitat value will be beneficial to the site and its environs.***

## 8.2 URBAN DESIGN

Addressed in Section 6.4 of this report.

## 8.3 TRAFFIC IMPACT

Traffic Design Group have undertaken a **traffic assessment**, attached as **Appendix 9**.

That report concludes:

*On the basis of this transportation assessment, it is concluded that the proposed residential development can be established with no more than minor effects to the function, capacity or safety of the surrounding traffic environment.*

*Specifically, the operation of the West Coast Road/Woodbank Drive and West Coast Road/Parrs Wood Road intersections will not be adversely affected as a result of this proposal with the development having only a minor effect.*

*Furthermore, there is nothing about the proposed new roads and intended development that should adversely affect the existing road safety record.*

***Accordingly, it is found there is no traffic planning reason to preclude the acceptance of the development proposal as presented.***

## 8.4 EARTHWORKS – SEDIMENT AND EROSION CONTROL

**Erosion and sediment control facilities** as shown on the enclosed drawings in **Appendix 10** will be required for the earthworks operations and will be constructed and maintained in accordance with Auckland Regional Council's Technical publication 90 (TP90).

The erosion control measures on site are generally determined by the existing topography of the site with Stages 2 and 3 being narrow strips of land bordered by the existing stream. As the actual area of Stages 2 and 3 is lower than Stage 1, combined with the difficulty in constructing a major sediment control facility i.e. sediment pond, it is proposed to control sediment from these areas with a combination of silt fence and decanting earth bunds.

With the area of Stage 1 being the largest of the site a conventional sediment control pond is proposed to treat sediment laden runoff from the majority of Stage 1 with silt fence along the lower portions of the site adjacent to the existing stream where construction of diversion bunds is not practical. This sediment pond is to be constructed as part of the permanent stormwater detention basin as detailed later in this report with the pond bunds, outlet and internal slopes constructed to the permanent facilities dimensions and the sediment from the earthworks construction being removed to the area rehabilitated for it's final use as a stormwater detention area.

All runoff diversion bunds are to be a minimum of 0.6 metres high and will convey sediment laden runoff into the sediment control ponds. The height of

these bunds has been calculated to contain and convey the 5% AEP storm event with appropriate freeboard.

The calculated sediment yield during the earthworks construction phase, as detailed in the USLE calculations contained in Appendices, is in the order of 5.6 tonnes. These calculations allow for the sediment retention pond to have chemical treatment facilities installed, therefore increasing the pond efficiency from 75% to approximately 95%. The use of alternative erosion control facilities such as silt fences producing a much lower control efficiency, which in this case contributes the majority of the calculated sediment yield.

All sediment control facilities will be constructed prior to topsoil stripping commencing. All sediment control facilities will be monitored during works with inspections during periods of rainfall. Any damage to these facilities will be immediately rectified.

### 8.5 STORMWATER DISCHARGE

From correspondence with the Auckland Regional Council we have been advised that the subject site area is covered by an existing **Comprehensive Discharge Consent**, No. 23006, a copy of which is enclosed in **Appendix 11**. This consent is held and controlled by Waitakere City Council.

It is our understanding that any new development within the catchment under the approval of Waitakere City Council is to comply with the Parrs Stream Stormwater Management Plan (CMP), dated 6 March 2003. As such if developments within the catchment comply with the existing consent, i.e. not require a variation to the existing consent, then consent to divert and discharge stormwater will not be required from the Auckland Regional Council.

It is proposed to control and treat the stormwater discharge from the development to the standards described in Auckland Regional Councils Technical Publication 10 (TP10). Following discussions with Ecowater it is also proposed to achieve hydraulic neutrality to pre-development levels up to a 10 year storm event. Details of the stormwater treatment and attenuation and treatment facilities are described later in this report.

All properties will be connected to the primary stormwater reticulation pipelines. Preliminary stormwater reticulation design layout is shown on the enclosed drawings.

The percentage of impermeable area for the current proposal is calculated at approximately 38%. This figure allows for all sealed and concreted hardstand areas, footpaths, vehicle crossings and individual unit landscape paving areas. **Calculations for the permeable/impermeable percentage** are contained in **Appendix 12**.

Pipe materials for the proposed stormwater reticulation will generally be rubber ring jointed, reinforced concrete (RCRRJ), in accordance with Waitakere City Council design standards. Connection for individual subdivision units will be to Waitakere City Council standards, usually by online 'Y' junctions and ramped risers if required, or by direct connection into the manhole. Catchpits are to be constructed generally in the positions shown.

Both the roading and accessway networks are utilized for the control and conveyance for overland flows. Preliminary design catchments, design flows and overland flow paths are shown the enclosed drawings.

#### **8.5.1 Stage 1**

As shown on the enclosed drawings and recommended by Waitakere City Council representatives, it is proposed to construct a wetland treatment facility within the northern portion of Stage 1. There are existing physical constraints in this area by way of the existing oil and gas easement, as well as the existing Waitakere City Council and Watercare sewer lines. To achieve a best quality solution to the constraints it is proposed to construct separate wetland water quality and detention facilities to either side of the existing services. The purpose of the wetland facility shown on the drawings is to provide water quality treatment for the equivalent Stage 1 area by way of a banded bathymetry wetland pond design to TP10 standards and landscaped accordingly. The detention basin shown on the drawings to the north of the wetland is to provide slow release erosion control of the initial 34.5mm as well as routing of the 2 and 10 year storm events to pre-development levels for an area equivalent to both Stages 1,2 and 3.

#### **8.5.2 Stage 2**

The development area contained within Stage 2 is constrained somewhat by the existing topography. This topography essentially excludes the ability to construct a quality stormwater attenuation facility for the Stage 2 catchment area. As this is the case, it is proposed to provide water quality treatment for the road carriageway area within Stage 2 by way of a swale or filtration facility within the road reserve and pro-rata attenuate the equivalent area of Stage 2 within the detention facility on the northern boundary of Stage 1.

#### **8.5.3 Stage 3**

An existing stormwater treatment facility in the location of Stage 3 of the development is constructed on the site and accommodates stormwater treatment for an existing residential development adjacent to the western boundary of Stage 3. This facility has a contributing catchment of 1.756 hectares according to the pond maintenance manual submitted to Ecowater.

As this existing facility is within the construction area of Stage 3, it is proposed to relocate and upgrade this facility, as shown on the enclosed drawings. It is proposed to accommodate treatment from the roading and hardstand areas within a grassed swale, approximately 30 metres long which discharges into the existing stream. Attenuation for the increased impermeable areas within Stage 3 will be on a pro-rata basis with the equivalent area of Stage 3 attenuated within a detention facility on the northern boundary of Stage 1..

## 8.6 GEOTECHNICAL MATTERS

A **Geotechnical Engineering Assessment** is attached in **Appendix 13**.

Although the assessment reveals several areas of instability, it proposes engineering solutions which will mitigate against these constraints.

## 8.7 TREES AND VEGETATION

The Arborist assessment of the site is attached as **Appendix 7**.

## 8.8 POTENTIAL SITE CONTAMINATION

Council records indicate that the site is not subject to contamination.

# 9.0 STATUTORY ASSESSMENT

## 9.1 PART II - SECTION 5: PURPOSE AND PRINCIPLES OF THE RESOURCE MANAGEMENT ACT 1991

Section 5 of the Resource Management Act sets out the purpose and principles of the statute, which is "to promote the sustainable management of natural and physical resources." The Act goes on to define "sustainable management" as meaning:

*"managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while —*

- (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."*

It is considered that the proposed development is consistent with the purpose and principles of the Act as:

- The development will help provide residential accommodation for those members of society who cannot provide for themselves in terms of the free market residential sector ; and
- As a result, the development will contribute to the social and cultural wellbeing of society; and
- At the same time, adverse effects can be avoided, remedied or mitigated.

## 9.2 SECTIONS 93 AND 94 OF THE RESOURCE MANAGEMENT ACT 1991

Section 93 (1) states that:

*"A consent authority must notify an application for a resource consent unless:*

- (a) the application is for a controlled activity; or*
- (b) the consent authority is satisfied that the adverse effects of the activity on the environment will be minor."*

As outlined in this report, we consider that adverse effects resulting from the development will be no more than minor.

Furthermore, it is considered that no persons are adversely affected by the proposed development.

In pre-application meetings with Council, the following areas of the site were identified as areas where potentially neighbour's written approvals of neighbouring sites would be required:

- Lot 56: 4 apartment units
- Lot 61: 14 apartment units

These two specific areas, and the wider development, are addressed specifically below.

### **Lot 56**

In earlier plans, the area of this lot, which contains 4 units, was approximately 1200m<sup>2</sup>. Council indicated that because the net unit area of 350m<sup>2</sup> per unit could not be provided, the potential for Council to request the written approvals of neighbouring property owners / occupiers existed.

Since that time, the site plan has been reconfigured so that the area of Lot 56 is greater than 1400m<sup>2</sup>, therefore ensuring more than 350m<sup>2</sup> is associated with each of the units.

As all bulk and location controls are complied with in relation to the external boundary, we consider that there are now no grounds for neighbours to be adversely affected.

### **Lot 61**

The discretionary element of the application relates to the higher density apartments in Stage 3, which do not comply with the requirement of 350m<sup>2</sup> net unit area and the maximum height control. These units should be viewed as an element quite distinct to the lower density nature of the balance of the development.

With respect to this higher density development, it is considered that the owners and occupiers of sites on the neighbouring land to the north-west are not affected for the following reasons:

- The proposed apartments are located on lower contours.

- Although the apartments comprise three or four levels, the basement level is excavated below the existing ground level, which essentially means a two-storey or at worst three-storey building face will be presented to the neighbouring properties to the west. Refer to sheet A303, Elevation 13 contained within Appendix 4 (the buildings will present as 3 and 4 level structures when viewed from *within* the subject site – refer Elevation 12 ).
- A significant buffer of between 20 - 25 metres will exist between the face of the apartment units and the face of the units on the neighbouring property to the west. Therefore the separation distance will be equivalent to that between homes separated by public road reserve. This buffer distance will help to mitigate any potential impacts on privacy or dominance.
- The units are located a significant distance to the east of the neighbouring properties, and have been designed to comply with the height in relation to boundary controls. Therefore there will be no impact in terms of shading.
- Comprehensive landscaping is proposed to soften the building development, in addition to the existing landscaping adjacent to the boundary on the adjoining site.
- The apartments will not be significantly divergent in character from the built form character of the neighbouring sites, characterised as they are by attached terrace housing building typology. The apartments represent an appropriate transition in built form between the medium density development on the neighbouring sites and the lower density development within the subject site. Elevation 13 on Sheet A303 shows the bulk of the proposed apartment buildings in relation to the corresponding buildings on the neighbouring site. As can be seen from this elevation, the bulk and scale of the proposed buildings is similar to the bulk and scale of the existing built form on neighbouring properties.
- A visual impact assessment has been undertaken by SOUL Landscape Architects and is attached as Appendix 7. That report concludes that: *"Overall, the change in visual character and habitat value will be beneficial to the site and its environs". Therefore it is considered that any visual impact will be positive in nature rather than generating any adverse effects.*

#### **Wider site development**

In relation to the majority of the development, the proposed site areas are greater than 350m<sup>2</sup>. Therefore the majority of the development which adjoins residential sites located on Pyramid Place, Titch Place and Woodbank Drive is consistent with the level of development contemplated as a limited discretionary activity under the District Plan. Limited discretionary activities are assessed without written approvals of neighbours.

We also note that the average net site area per unit across the site is 373m<sup>2</sup>. Therefore, whilst some of the development is of a density higher than one unit per 350m<sup>2</sup>, specifically Stage 3, looking at the site as a whole the intensity of development is low.

Expert input into this assessment suggest that environmental impact in relation to traffic, sedimentation and erosion, stormwater discharge, stability, and vegetation removal will be no more than minor.

As we consider the adverse effects to be no more than minor, we consider that the proposal can be processed on a non-notified basis without written approvals as no persons are considered to be adversely affected.

## 10.0 CONSULTATION

Council have indicated that the following Iwi have an interest in this area:

- Te Kawerau a Maki

Accordingly, a copy of this AEE has been forwarded to that Iwi. A copy of the covering letter is attached as **Appendix 14**.

Once feedback is received from that Iwi it will be forwarded to the Council.

Pre-application meetings have been held with Senior Council staff who have indicated general support for the proposal in principle. In particular, the project team has been particularly conscious of involving Peter Joyce, Urban Designer at Council.

## 11.0 DEVELOPMENT CONTRIBUTIONS

As the application has been lodged prior to 1 July 2006, the existing development contribution regime applies.

Council has advised on this basis that the development contribution payable is \$613,657.09. A cheque has been deposited at lodgement on 26 June for this figure.

As the proposed development will incorporate a number of energy efficient measures, as discussed in Section 5.3 of this report, the applicant will seek to apply for a development contributions rebate at building consent stage. The "TUSC" sustainable rating system will be applied at that stage to determine what level of remission is provided.

Council have also advised that a "Twin Streams" financial contribution for stormwater mitigation is also required, to be charged as a condition of resource consent. We anticipate that remission will also be available on this contribution given the significant area of landscaping together with weed management proposed.

## 12.0 CONCLUSION

Following a full and comprehensive assessment of the proposed development, it is considered that the proposal satisfies current best practice in urban design for medium density developments.

Any District Plan infringements are considered non-consequential, and an assessment of the merits of the proposal reveal that the development will positively enhance the amenity values of the area, whilst avoiding any adverse effects on the environment. All expert reports appended to this application conclude that adverse effects generated will be no more than minor.

It is considered that all statutory "tests" under the RMA are satisfied. In particular, it is considered that the proposal is not contrary to any of the matters contained in Part II of the RMA.

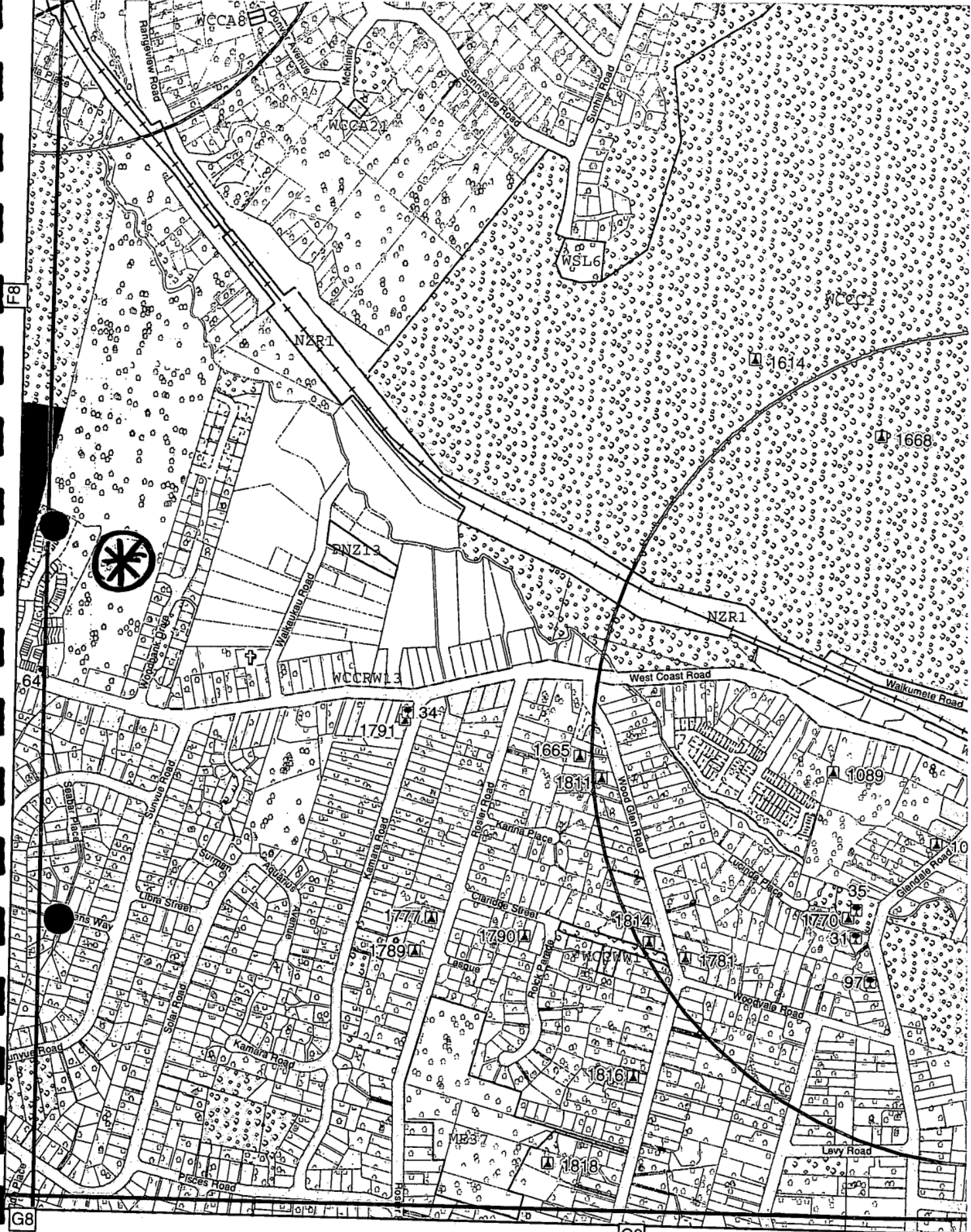
We are of the view that the proposed development will come to represent "best practice" as a demonstration project providing for affordable entry level housing which subscribes to good urban design principles and sustainability.

Therefore it is considered appropriate for resource consent approval to be granted, without notification, and subject to fair and reasonable conditions of consent.

Matthew Paetz  
Senior Planner – Babbage Consultants

## **APPENDIX 1**

### **Location Plan**



## **Appendix 2**

### **Certificates of Title**



# COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R.W. Muir  
Registrar-General  
of Land

## Search Copy

**Identifier** 163629  
**Land Registration District** North Auckland  
**Date Issued** 02 September 2004

### Prior References

NA117B/312

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**Estate** Fee Simple  
**Area** 7948 square metres more or less  
**Legal Description** Lot 3 Deposited Plan 339810

**Proprietors**  
New Zealand Housing Foundation

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### Interests

Subject to a right of way (in gross) over part N on DP 339810 in favour of the Waitakere City Council created by Transfer 6070221.1 - 7.7.2004 at 9:00 am

Subject to a stormwater detention and drainage easement (in gross) over part M on DP 339810 in favour of the Waitakere City Council created by Transfer 6070221.2 - 7.7.2004 at 9:00 am

Subject to a drainage easement (in gross) over part marked L on DP 339810 in favour of the Waitakere City Council created by Easement Instrument 6135712.4 - 2.9.2004 at 9:00 am

The easements created by Easement Instrument 6135712.4 are subject to Section 243 (a) Resource Management Act 1991 6551320.5 Mortgage to Housing New Zealand Corporation - 29.8.2005 at 9:00 am



# COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



Search Copy

R.W. Muir  
Registrar-General  
of Land

Identifier **163628**  
Land Registration District **North Auckland**  
Date Issued **02 September 2004**

**Prior References**  
NA117B/312

---

Estate	Fee Simple
Area	4.9336 hectares more or less
Legal Description	Lot 2 Deposited Plan 339810

**Proprietors**  
New Zealand Housing Foundation

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**Interests**

Subject to a pipeline right over part marked B on DP 339810 created by Transfer B344219.1 - 30.10.1984 at 10:55 am  
Subject to an oil and gas supply right (in gross) over part marked B on DP 339810 in favour of Natural Gas Corporation of New Zealand Limited created by Transfer B344219.1 - 30.10.1984 at 10:55 am  
6135712.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 2.9.2004 at 9:00 am  
Subject to a drainage easement (in gross) over part marked K, B & G on DP 339810 in favour of the Waitakere City Council created by Easement Instrument 6135712.4 - 2.9.2004 at 9:00 am  
The easements created by Easement Instrument 6135712.4 are subject to Section 243 (a) Resource Management Act 1991  
6551320.5 Mortgage to Housing New Zealand Corporation - 29.8.2005 at 9:00 am

## Felicitas Dhliwayo

---

**From:** Jodie Mitchell [jodiemitchell@slingshot.co.nz]  
**Sent:** Wednesday, 1 November 2006 8:49 a.m.  
**To:** Felicitas Dhliwayo  
**Cc:** Renee Lambert; Jeannette Ibrahim  
**Subject:** RE: 423 West Coast road

Hi Felly

Apologies for not getting back to you yesterday I was out at Waitakere for the day and didn't have access to my e-mail.

As the date of certified establishment would be prior to the release of the 224(c) I don't have any problems with condition 8 being attached to the subdivision. The maintenance bond relates to the 224(c) stage also.

Perhaps an advice note with the LUC briefly outlining their responsibility in this regard and that such a condition will be applicable at the time of the SUB will ensure that the applicant is aware/understands this aspect to avoid any later confusion.

Jodie

*Jodie Mitchell  
Planning Consultant  
ph/fax 09 575 3635  
Mob 021 664 807  
Postal Address: 26 Kesteven Ave  
Glendowie  
Auckland 1005*

-----Original Message-----

**From:** Felicitas Dhliwayo [mailto:Felicitas.Dhliwayo@waitakere.govt.nz]  
**Sent:** Tuesday, October 31, 2006 9:10 AM  
**To:** Jodie Mitchell  
**Cc:** Renee Lambert; Jeannette Ibrahim  
**Subject:** 423 West Coast road

Hi Jodie

We have decided to process the above application as a separate landuse and subdivision instead of a combined one. This is because the applicants would like to start earthworks as soon as possible and it appears there are still issues with Ecowater conditions which need to be addressed. Therefore we are trying to get the landuse consent signed off today if possible.

However we have noted that Condition 8 of the Parks conditions requires the payment of a bond and this will take about 5 days to process before the consent is issued. Therefore this condition will delay the issue of the landuse consent. Is it possible to put this condition under the subdivision application? If this is possible then it means the landuse consent can be granted and issued as soon as possible. Please let me know if this is okay.

Thanks

Felly.

---

Note:

This message is for the named person's use only. It may contain confidential, proprietary or legally privileged information. No confidentiality or privilege is waived or lost by any mistransmission. If you receive this message in error, please immediately delete it and all copies of it from your system, destroy any hard copies of it and notify the sender. You must not, directly or indirectly, use,

1/11/2006

disclose, distribute, print, or copy any part of this message if you are not the intended recipient.

Any views expressed in this message are those of the individual sender, except where the message states otherwise and the sender is authorised to state them to be the views of any such entity.

Thank You.

<http://www.waitakere.govt.nz>

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Memorandum

To	<b>Felicitas Dhlwayo</b> Consent Services Civic Offices
From	<b>Lucy Lunevich</b> Water & Drainage Engineer <b>EcoWater Solutions</b>
Date	Thursday, 26 October 2006
Subject	<b>ECO-WATER CONDITIONS – SUB</b>

**RMA No. 20061078**

**SPW No. 22816**

**Address: 423 – 429 West Coast Road**

**Applicant: NZ Housing Foundation**

The following conditions are based on an assessment of the information provided with your application, and additional information supplied by you following a Section 92 request for further information addressing storm water treatment and detention on the site. Council has reviewed the impact the development would have on the environment and on EcoWater's infrastructure. When examining the application, reference was made to Council's Code of Practice for City Infrastructure and Land Development (WCC COP), District Plan and relevant ARC publications. In addition, Council engineers responsible for Water Supply, Wastewater, Stormwater, Subdivision and Consents were also requested to review your application.

**1: SECTION 223 REQUIREMENTS**

- (a) As required by Condition (EW 5) below, define the 1 in 100 year overland flow path and provide a drainage easement(s) in gross in favour of Council in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon." Notes:
- (i) The easement document will be prepared by Council's Solicitor at the applicant's cost.
  - (ii) Prior to submitting the survey plan for Section 223 certification, obtain EcoWater's approval to the drainage easement.

*This condition is required to comply with WCC COP (Refer section 4.2, 4.3.2.2, 4.3.4, 4.3.7.2).*

- more appropriate*
- (b) Provide drainage easements (for the services through Lots to Lots to protect the existing or proposed connections) in a Memorandum of Easements endorsed on the survey plan. Include in the Section 223 approval on the plan, "subject to the granting or reserving of the easement(s) set out in the Memorandum hereon."

*This condition is required to comply with WCC COP (Refer section 6.3.4).*

**2: SECTION 224C REQUIREMENTS**

**ECOWATER CONDITIONS (PUBLIC DRAINAGE)**

- (EW 1) Before the commencement of any work, obtain the approval of Council to engineering plans and specifications prepared in accordance with Council's "Code of Practice for City Infrastructure and Land Development" detailing the nature and extent of any proposed work. The engineering plans submitted will be processed separately and any amendments required will be advised in the engineering approval. *This condition is required to comply with WCC COP (Refer section 1.8).*

- (EW 2) Design, provide and install a complete public wastewater reticulation system to serve all Lots in compliance with Councils Code of Practice for City Infrastructure and Land Development (Refer Section 5.0). Specific requirements:
- (i) Under specific engineering approval extend the public wastewater system from the existing points within the site to serve each residential Lot within a separate connection to the public system. Specific requirements:
  - (ii) At the stage of engineering approval provide the written consent from Water Care Services Ltd to build over their sanitary sewer line.
  - (iii) No storm water treatment devices are permitted to be build above the public sewer lines.
  - (iv) Re-route the existing public drainage lines passing through Lot(s) 31-32 to provide more adequate building sites for those Lots. At the stage of engineering approval a quote will be obtained from Councils contractor for the proposed re - location of the reticulation system and new manholes required on the existing wastewater network.
  - (v) Design and install the new reticulation system clear from the proposed building platforms. Locate all drainage lines in the front on Lots where possible to provide ease of access for future maintenance requirements.
  - (vi) Advice Note: EcoWater policy requires any wastewater manholes or line connections to be constructed by EcoWater Solutions maintenance contractor. Wastewater manhole connections may be constructed by the applicant's contractor with engineering plan approval and under EcoWater's Quality Assurance supervision or by EcoWater Solutions maintenance contractor.

*This condition is required to comply with the WCC COP (Refer section 5.0). The condition specifies location and design features required for the proposed drainage lines to minimise long term maintenance costs, increase accessibility and to minimise the likelihood of ground water infiltration into the public drainage system.*

- (EW 3) Take note that the existing public sanitary sewer passing through Lots may need to be re-laid at the owners expense (for that length below and one metre either side of the new dwelling) at the time application is made for building consent on this Lot. The building consent application shall include a cctv video inspection of the wastewater drain and foundation bridging details.

*This condition is required to comply with the WCC COP (Refer section 4.4.3). An information leaflet is available from Council's Front Counter on building over public drains.*

- (EW 4) Design, provide and install a complete public storm water drainage system to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 4.0). Specific requirements:

- (i) Under specific engineering approval install the public storm water system to serve each residential Lot within a separate connection to the public system. Specific requirements:
- (ii) Extend storm water line from the upstream properties 32, 34, 36 and 38 Wood Bank Drive.
- (iii) Collect all existing discharge points. The system shall include connection to down pipes or drainage from any proposed buildings/paved areas.
- (iv) Design the storm water network clear from the proposed building platforms.
- (v) Obtain the written consent of the owner(s) if necessary prior to the commencement of work and obtain written evidence of their satisfaction with the restoration.

*This condition is required to comply with the WCC COP (Refer section 4.0). The above condition specifies location and design features required for the proposed drainage lines to minimise long term maintenance costs, increase accessibility and to minimise the likelihood of ground water infiltration into the public drainage system.*

- (EW 5) That all new buildings must be constructed at least 500mm above the 1% AEP flood plain or the level of any downstream hydraulic control (500 mm above the crest of any road embankment), whichever is higher.

- (EW 6) Provide a catchment analysis, define and form the 1 in 100 year overland flow path. Provide an As Built plan of the overland flowpath showing a long section and cross section for inclusion in Council's Hazards and Special Features Register.

*This condition is required to comply with the WCC COP (Refer section 4.2, 4.3.2.2, 4.3.4, 4.3.7), and because a site visit / EcoWater records / the Hazard Register / EcoWater Catchment Studies has revealed that the property is affected by overland stormwater flows in the 1 in 100 year storm event. This overland flowpath is required to be registered on the title by easement and on Council's Hazards and Special Features Register to ensure that future development does not take place in this flowpath.*

To prevent increasing downstream flooding and increased channel erosion on the Opanuku Stream, stormwater disposal is required to comply with the Parrs Stream Management Plan (Consent number 23006).

A consent notice is to be issued and registered on the new title(s) for Lot(s) stating that the stormwater disposal system from any development on the site shall be designed to incorporate the following requirements to the satisfaction of EcoWater:

- i) The proposed development must comply with the Parrs Stream Management Plan (Consent number 23006).
- ii) That new developments should incorporate storm water management measures to restrict their post-development 50% AEP flows to their pre-development levels.
- iii) Mimic natural runoff patterns, and not to discharge directly to a watercourse, open drain or piped system.
- iv) To allow 20m average riparian margins from the centreline of the stream channel, and 4.5m above stream bed level. *Individual lot to comply*
- v) The proposed storm water treatment devices must be capable of 75% sediment removal (as per the ARC Technical Publication No 10).
- vi) Open channels within the site must be monitored for channel erosion, and appropriate mitigation works implemented as and when necessary for the period of the construction works.
- vii) Note: Council's Hazards and Special Features Register will be advised of the above requirements.

*This condition is required to ensure that the stormwater flow and volume from the development is kept to predevelopment levels for various storm events. This is necessary to ensure already severe downstream flooding is not increased as a result of development. It is also required to ensure channel erosion in the Opanuku Stream or its upper tributaries is not increased. The most effective means for achieving this outcome is replanting, roofwater re-use and minimising impervious areas.*

(EW 8)

Provided attenuation and treatment devices to serve the development as per the Waitakere City Council Comprehensive Discharge Consent for the Parrs Cross Catchment and WCC Code of Practice for City Infrastructure and Land Development (refer Section 4).

- i) The proposed swale will be replaced the exiting pond to serve the Stage 3 of the development and upstream properties (Albion Vale catchments). At the stage engineering approval application provide a methodology of the relocation of the excising storm water device (pond).
- ii) Provide calculation for each treatment device to comply with ARC TP 10 requirements.
- iii) The approved access to treatment device(s) must remain available at all times for the design lifetime of the pond.
- iv) Mechanism to drain the main pond and the forebay without the necessity for pumping (over pumping). In other words, wherever practical, it should be possible to drain the main pond and the forebay by gravity flow.
- v) Provide maintenance manual and procedures for the removal and disposal of sediment including frequency.
- vi) The need for armoured spillways when the discharge velocity is greater than 2m/s for more than one-hour duration.
- (i) Provide engineering plans and calculations to EcoWater for approval prior to commencing works.
- (ii) Provide a planting plan, including species list, quantities, and methodology to EcoWater and Parks for approval prior to commencing planting.
- (iii) Provide a surveyed as-built plan of the device showing all lid and invert levels, permanent water level, and contours at 200mm intervals below water level.

*X (EW 7)  
changed  
to exclude  
from the  
flow*

- (iv) Provide a geotechnical completion report certifying construction of the pond.
- (v) Provide a maintenance manual for the treatment device.

*This condition is required to ensure that adverse effects of the proposed development on local waterways and receiving environments are mitigated. Stormwater quality treatment intercepts a percentage of silts, sediments, heavy metals and other pollutants washed off road carriageways and impermeable surfaces that would otherwise degrade the environment.*

- (EW 9) All ponds shall be operated and regularly maintained by the developer, or his agent, for a period of one year with the planting being maintained for two growing seasons. At the end of the two growing season period a final inspection and handover to Council's Storm water Operations department shall take place. The following activities and procedures shall be completed to Council's satisfaction prior to final acceptance of the pond(s):
- (i) During building operations on individual lots, a significant amount of sediment is likely to enter the pond(s). Accordingly, the developer shall ensure that the pond(s) are cleaned and de-silted and sediment disposed of to the developer's own approved site.
  - (ii) Any rubbish collected and disposed of appropriately.
  - (iii) Planting well established and maintained for the two growing seasons. Grass cut regularly and dead plants replaced with the same or similar or bonding arrangements suitable to the Development Engineer arranged.
- (EW 10) Design, provide and install a complete public water supply reticulation system and fire fighting services to serve all Lots in compliance with Council's Code of Practice for City Infrastructure and Land Development (Refer section 6). Specific requirements:
- (i) Under specific engineering approval install the public water supply system from within the site to serve each residential Lot within a separate connection to the public system. Specific requirements:
  - (ii) Provide and install a private water service pipe to the body of each Lot as specified in WCC COP Section 6.3.12 Case 1.
  - (iii) Pay to the Council the cost of supervising the shut down of Council's water supply mains. This service includes Council providing written advice to all affected property owners/tenants.
  - (iv) Provide a detail showing the proposed connection to the existing Council watermain/s. The detail is to include all flanges, joints and applicable details. In addition any water reticulation plan is to show all necessary design details to inform construction (eg. thrust blocks etc).
  - (v) Provide and install a fire hydrant within 135 metres of the farthest point of fire risk and within 65m of the end of a cul-de-sac. Note: The hydrant is to be on a direct traffic route to the property. The distance specified above may not be measured as a radius.
  - (vi) Where the required public system is on private property, easements over the course of such system in favour of Council will be necessary.
- This condition is required to comply with the WCC COP (Refer section 6.0), and to specify location and design features required for the proposed water reticulation to minimise long term maintenance costs, increase accessibility and encourage property owner accountability for water use and water conservation.*
- (EW 11) Provide in the design of services for the reticulation of the upstream catchment and install such reticulation to the boundary of the upstream properties.
- (EW 12) Where drainage work is required to be carried out on land outside the subdivision, obtain the written consent of the owner(s) of that land prior to the approval of the drainage plans. After construction and prior to Section 224 release, obtain the written acknowledgement of the owner(s) that the property has been satisfactorily reinstated.

*This condition is required to comply with the WCC COP (Refer section 1.6.2.3).*

- (EW 13) Contact EcoWater's Subdivisions Assistant (ph 8368000ext8248) to arrange a pre-start meeting. Plans are required to be submitted and Engineering Approval obtained before requesting a pre-start meeting.
- (EW 14) Provide an As-Built drainage plan prepared by a registered surveyor and cctv video inspection of the new public drainage, in accordance with WCC COP.

## FEES, BONDS & CONTRIBUTIONS

- (FC 1) Pay any EcoWater engineering, works supervision, 224c processing, and administrative fees as incurred. These fees will be charged at Councils advertised schedule of fees.
- (FC 2) Pay a 2½% maintenance deposit (minimum \$500.00) on the value of works being taken over by Council, which is refundable upon final acceptance of the works at the end of the maintenance period.

*This condition is required to comply with the WCC COP (Refer section 1.10.1, 1.11.5.1, 5.7 Quality & Release Section).*

- (FC 3) Pay to the Council pursuant to Section 407/409 of the Act the sum of **\$207,492.01 (incl. GST at 12.5%). This includes \$30,071.34** for 18 units and **\$177,420.67** for 59 dwellings (incl. GST at 12.5%) towards the mitigation of downstream flooding through the Twin Streams Project (Oratia / Opanuku Stream Catchment) necessary to serve the subdivision. (\$1,670.63 per additional unit or \$3,007.13 per additional Lot).

*This condition is required to comply with the requirements of Section 283 of the Local Government Act, and because stormwater drains in the catchment are under capacity to accommodate development to permitted activity level. Therefore the applicant is required to contribute towards the cost of upgrading the under capacity drainage to enable development to proceed without increasing the frequency or severity of overflows.*

## GENERAL CONDITIONS

- (GL 1) Advise Council the name of the Consultant and/or person(s) who will be the developer's representative fulfilling engineering responsibilities as detailed in section 1.4.1 of Council's Code of Practice for City Infrastructure and Land Development.

A résumé stating the qualifications and experience of the nominated representative may be required at the Council's discretion.

Note: WCC COP requires the developer to appoint a suitably qualified and experienced person for any projects that involve development works for which standards are specified in the COP. On larger projects (those with public roading) a Registered Engineer or Registered Surveyor will be deemed to meet these criteria. The developer's representative shall have insurance liability and indemnity cover as appropriate, and be responsible for the following:

- i) Investigating, designing and obtaining approvals for the works.
- ii) Providing contract administration and engineering supervision of the works.
- iii) Co-ordination of specialist responses e.g. geotechnical, hydrology, structural reporting.
- iv) Certification of the works upon completion.

*This condition is required to comply with WCC COP (Refer section 1.4).*

## Felicitas Dhlwayo

---

**From:** Gordon Griffin  
**Sent:** Wednesday, 25 October 2006 10:14 a.m.  
**To:** Felicitas Dhlwayo  
**Subject:** West coast rd Landscape conditions.doc

Felly please save these changes, regards, Gordon

---

Landscape development on private lots including framework planting shall be in general accordance with ~~as per~~ the landscape Master Plan and Typical Garden Layout, Drawing LSP-01 Rev C and LSP-02 Rev C, both dated 16.06.06 and in accordance with the Street Tree Planting Plan 1 of 2 Drawing LSP-05 Rev B, and Street Tree Planting Plan 2 of 2 Drawing LSP-06 Rev B both dated 15.08.06 by SOUL Environments and the 'Additional information on proposed planting' Rev C, received at Council 16 October 2006, and shall be established to the satisfaction of Council's Environmental Monitoring Officer, Resource consents.

Comment: The first two are concept type plans with latitude and so in general accordance is fine for them, the latter street planting plans are specific, there has been significant to and fro with council over these and we are now happy with them, provided they are implemented as shown. Therefore 'in accordance with' is necessary.

On site planting for each private lot shall have the framework tree planting and fencing as per the afore-cited plans and shall have lawn areas, gardens, paving and other site features, in general accordance with the 'Typical Planting Plan House Type 4A, dated 7.08.06 and 'Typical Garden Layout House Type 4B' dated 16.08.06 plans and associated planting schedule by Soul submitted with the application and to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents. –

I do not accept the following addition: The typical master plan allows for some flexibility, and so it is acknowledged that this will happen to an extent, but the framework tree planting associated with the street tree planting, which includes trees planted on private lots, has had considerable negotiation to agree to it and should be as proposed. Therefore the following addition is not desirable or required. It should be noted however that a measure of the stated flexibility has been provided for. Delete the following therefore.

However in order to allow for personalisation of individual lots, a degree of flexibility will be provided for in landscaping.

Grassed areas shall be manually graded to be flush with adjacent paved areas and shall be prepared prior to occupation of units and establishment of any proposed fencing. Fences and gates shall be set in place following final forming of ground levels including grassed areas. Garden areas and grassed areas shall be good quality topsoil or garden mix (50:50 topsoil and compost), weed and debris free with garden areas to 300mm depth minimum and grassed areas to 200mm minimum depth.

Comments: Change made above on basis of comments made and accepted.

~~400mm~~ 400mm This depth is excessive -plan specifies 300 for planting areas. Grass areas would only reasonably require up to 200mm topsoil to establish good turf minimum depth and shall be to the satisfaction of Council's Environmental Monitoring Officer Resource Consents.

OK, I will accept gardens depth be to 300mm and to 200mm for grassed areas. (Parks Department has a code of Practice standard requiring it be to 400mm )

Planting shall be set in place in the first planting season (May till 7<sup>th</sup> September) following use of each dwelling unit to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents. If the development is staged then the landscape development including planting shall be staged accordingly. The planting in the lower stream bank area would be at risk if planted in rainy

season – suggest spring – Oct to Nov.

Comments: This is for Parks Department to agree about as it is outside the private area. It should be noted that the planting season is May till 7<sup>th</sup> September however. Outside of this period the ground gets drier, the days longer and warmer, the dessicating equinoxial winds start Oct, all making for higher evapo-transpiration pressures on plants and so establishment of plants more difficult. Project twin streams plants in the planting season and it would be unwise, with far greater losses expected and poorer plant growth, to plant outside of the planting season. I do not support Matthew Paetz's request. It ignores the fact that planting must occur within the planting season to have a reliable and good success rate. Perhaps later rather than earlier, eg towards mid September, would address his concerns, with no need to change the condition therefore, but from when the plants go in, root growth develops and they start to provide stability anyway. They are unlikely to be washed away.

Any tree planted within a grass area shall be within a 600mm diameter weed and debris-free garden area with a woodchip mulch to 60mm depth, and with two marker stakes 50mm x 50mm x 1.2m per tree (ties not required).

Lawn areas and gardens shall be watered as necessary to facilitate establishment, and with gardens kept weed free on an ongoing basis for the first two years following initial planting to the satisfaction of the Environmental Monitoring Officer, Resource Consents. Any tree or plant that dies, is removed This seems unreasonable , especially for private lots where the developer could not be reasonably expected to control removal of trees or other acts of wilful damage over a 2 year period. Should only reasonably expect replacement of losses in public lots due to lack of care. or otherwise fails to establish shall be replaced the following planting season and maintained for a further two years to the satisfaction of the Environmental Monitoring Officer, Resource Consents.

Comment:

We have given consent on an agreed outcome. Therefore this is a reasonable condition. The applicant can advise property owners of the conditions of consent and expectations and obligations that apply. It is desirable that the framework trees be replaced if they die. Please note however that the wording, 'to the satisfaction of the environmental Monitoring Officer, Resource Consents' implies some potential judgement in the circumstances. He or she is likely to be reasonable and to make reasonable requests. I consider that this condition should apply as worded. I am confident that the EMO will use his/her intelligence and fair judgement to ensure that we have an acceptable outcome. In short, this is not unreasonable.

Gordon Griffin, Landscape architect.

Waitakere City Council  
Private Bag 93 109  
Henderson  
Waitakere City 1231  
New Zealand

Job Number: 42608/C  
fk  
19 October 2006

Attention: Felicitas Dhliwayo

Dear Felicitas

Housing Development  
West Coast Rd (No. 423-429), Henderson  
**Ecowater Draft Consent Conditions – RMA No. 20061078/SPW No. 22816**

Further to your email to Matthew Paetz concerning the Ecowater draft consent conditions from Lucy Lunevich, we have the following comments with reference to your numbering:

1. SECTION 223 REQUIREMENTS

- (a) The 100 year overland flow path except as otherwise noted will be within the public roads.
  - (i) We are agreeable that the Council's Solicitor should prepare the easement document but we request the right to review this document prior to finalisation.
  - (ii) We would assume that during the preparation of the easement document referenced above, that Ecowater would have been consulted and therefore approval of the document would be implicit.
- (b) Can you please confirm this relates to watermains only. **Can be confirmed at the stage of 223 only, if it won't be applicable we will say so.**

2. SECTION 224C REQUIREMENTS

(EW2)

- (ii) We do not propose to do any building works over the Water Care Services Ltd sanitary sewer line. We will be placing fill above the sanitary sewer line and we will obtain requisite consents for this work. **Water Care Services's line exists along the proposed pond/wetland and according the WCC policies are required to confirmation from Water Care Limited. Please provide a confirmation at the stage of an engineering approval application.**

- (EW5) We note that with the lot size, unacceptable gradients would exist for access from the road to the garage if 500mm was applied. We request that the 500mm above the crest of any road embankment be changed to 150mm above the road crown or the ground level at the back boundary in accordance with the Acceptable Solution E1/AS1 of the

Building Industry Authority. With reference to Lot 56, it should be noted that the garage level is at 25.5 and the habitable level is on the second storey. **It is fine. A consent notice on the title of new property will be required.**

(EW7) We note in Section 1.3 paragraph 1 that Ecowater's Countryside and Foothills Stormwater Management Code of Practice only applies to lot sizes greater than 4,000m<sup>2</sup> and as such is not applicable to our proposal. We request all reference to this document be removed. **No problem. Will specify only the existing Parrs Storm Water Discharge Consent.**

(i) As per our previous discussions and correspondence relating to this matter, we request that such agreed conditions should be reflected in the consent notice. **Yes. It is consent notice**

(iii) This condition is contrary to our design as accepted by Waitakere City Council/Ecowater Officers as best engineering practice for this development. We request that this condition be removed. **This condition is not contrary to an approach submitted by the Consultancy. However, if your engineers believe that the proposed storm water mitigation approach does not meet this condition you may need to re-visit a design concept.**

(iv) Information has been provided to confirm the design complies with a 20m average riparian margin over the whole development. In respect to Lots 8, 13-18 and 30-34 inclusive the application of 4.5m above stream bed level is impractical owing to there horizontal displacement from the confluence of the streams. Due to the width of the flood plain adjacent to these lots it was agreed with Waitakere City Council/Ecowater that this condition was inappropriate for these lots. Please modify the consent accordingly. **A consent notice on the title of each Lot will be required to advise the outlined above.**

(vi) We request that this item is changed to include the period of monitoring which would be for the period of the construction works. **No problem can be amended.**

(EW11) We note that all development upstream of our development is completed and as such no reticulation is required so we therefore request the deletion of this item. This is standard condition and must be a part of nearly each development.

Yours faithfully

Thank you for your comments. Do not hesitate to contact me if necessary.

**N S ( Paddy) Luxford**  
**Babbage Consultants Limited**

cc Lucy Lunevich – Ecowater Solutions

*Design is to avoid discharging direct into the watercourse.*



BABBAGE CONSULTANTS LIMITED  
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PHONE: 0-9-379 9980, FAX: 0-9-377 1170  
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WAITAKERE CITY COUNCIL

20 OCT 2006

679614

Waitakere City Council  
Private Bag 93 109  
Henderson  
Waitakere City 1231  
New Zealand

Job Number: 42608/C  
fk  
19 October 2006

Attention: Felicitas Dhliwayo

Dear Felicitas

Housing Development  
West Coast Rd (No. 423-429), Henderson  
**Ecowater Draft Consent Conditions – RMA No. 20061078/SPW No. 22816**

Further to your email to Matthew Paetz concerning the Ecowater draft consent conditions from Lucy Lunevich, we have the following comments with reference to your numbering:

**1. SECTION 223 REQUIREMENTS**

- (a) The 100 year overland flow path except as otherwise noted will be within the public roads.
  - (i) We are agreeable that the Council's Solicitor should prepare the easement document but we request the right to review this document prior to finalisation.
  - (ii) We would assume that during the preparation of the easement document referenced above, that Ecowater would have been consulted and therefore approval of the document would be implicit.
- (b) Can you please confirm this relates to watermain only.

**2. SECTION 224C REQUIREMENTS**

(EW2)

- (ii) We do not propose to do any building works over the Water Care Services Ltd sanitary sewer line. We will be placing fill above the sanitary sewer line and we will obtain requisite consents for this work.

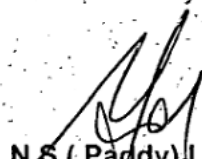
(EW5)

We note that with the lot size, unacceptable gradients would exist for access from the road to the garage if 500mm was applied. We request that the 500mm above the crest of any road embankment be changed to 150mm above the road crown or the ground level at the back boundary in accordance with the Acceptable Solution E1/AS1 of the Building Industry Authority. With reference to Lot 56, it should be noted that the garage level is at 25.5 and the habitable level is on the second storey.

- (EW7) We note in Section 1.3 paragraph 1 that Ecowater's Countryside and Foothills Stormwater Management Code of Practice only applies to lot sizes greater than 4,000m<sup>2</sup> and as such is not applicable to our proposal. We request all reference to this document be removed.
- (i) As per our previous discussions and correspondence relating to this matter, we request that such agreed conditions should be reflected in the consent notice.
  - (iii) This condition is contrary to our design as accepted by Waitakere City Council/ Ecowater Officers as best engineering practice for this development. We request that this condition be removed.
  - (iv) Information has been provided to confirm the design complies with a 20m average riparian margin over the whole development. In respect to Lots 8, 13-18 and 30-34 inclusive the application of 4.5m above stream bed level is impractical owing to there horizontal displacement from the confluence of the streams. Due to the width of the flood plain adjacent to these lots it was agreed with Waitakere City Council/Ecowater that this condition was inappropriate for these lots. Please modify the consent accordingly.
  - (vi) We request that this item is changed to include the period of monitoring which would be for the period of the construction works.

(EW11) We note that all development upstream of our development is completed and as such no reticulation is required so we therefore request the deletion of this item.

Yours faithfully

  
N S (Paddy) Luxford  
Babbage Consultants Limited

cc Lucy Lunevich – Ecowater Solutions

Chief Executive	
Corporate Services	
City Services Moselle	
Consultancy Services	
ECO - WATER	
Strategic Group	
Consent Services	✓
Field Services	

439 West Coast Road:  
RMA 20061077

We will seek comment from the Parks arborist re street tree planting, and whoever at Parks has the authority for approving the reserve planting and weed management. With regard to on-site planting proposed, the Landscape Master Plan, and Typical Garden Layout plans are good as far as they go, but are incomplete in terms of being able to use them to carry out the planting. It is desirable that each plan have a planting schedule so that it is not just a concept plan, and can be followed for implementation.

I can approve the on-site planting only. In this regard, the Typical Garden Layout plan applies. In this regard, proposed 0.8m high front fences do not appear to be shown (but are on the key), I would recommend a linear clothesline in preference to a rotary one (as linear ones compromise space less).

There would be a lot of hedges. I have concerns re the maintenance required to keep these right. Where there would be a 1.8m high fence, wouldn't it be better to have some trees or medium sized shrubs within a few defined garden areas, rather than a hedge fronting a fence? For frontages, where some surveillance of the road is required, a low fence with some low shrubs, would be preferable to a hedge that may grow well above the intended 0.8m height). This may be intended, but without species proposed, it is not possible to evaluate adequately.

Comments on tree species proposed (as per planting schedules):

List A (for street trees and front yards) would be mostly very large trees: Pin oak grows to circa 18m high, similarly red oak, liquidambar and Claret ash. Oak leaves fall over a long time and don't break down quickly. When we have a planting plan it will be clearer whether the tree planting plan would have any problems. The Paulownia tomentosa would be of a better scale for within the residential sites. Puriri does not make a good street tree unless there are very wide road verges. Ash has pinnate leaves that blow away with fewer problems. I suggest for a deciduous tree on site, Ulmus parvifolia, Chinese elm. This has a suitable scale.

A Tree planting Plan and schedule is needed associated with the landscape Master Plan therefore.

(Parks have say re the revegetation areas but I add my comments): Stream edge planting: Species look fine, could include kahikatea, Dacrycarpus dacrydioides in the stream margin area also.

Schefflera digitata is frost sensitive and probably better not used as a pioneer species.

List E: Low to medium shrubs for reserve and garden areas:

Don't use Coprosma kirkii, it is invasive and dull (and of hybrid origin). Preferably use species naturally occurring in Waitakere City ahead of outside forms. Eg Don't use Coprosma repens 'Poor Knights'.

Don't use Raphiolepis umbellata, which seeds everywhere and becomes a weed species. (Though has yet to be listed as environmentally damaging).

Include some locally occurring native shrubs, eg Coprosma lucida, Corokia buddleioides, C cotoneaster.

Felicia amellioides and Strobilanthes anisophyllus are subshrubs and relatively weak exotic plants. We want a framework of planting, of garden areas, trees and shrubs that are likely to endure. Those residents that garden can add such plants if they are interested at a subsequent stage. I consider these species are suitable.

Identify proposed hedge species.

Some of the species listed, eg Luculia grandifolia, Viburnum 'Emerald Lustre', are better as specimen shrubs rather than as hedge species (This is fine but don't use them as hedges).

Proposed street lighting locations should be shown on the Landscape Master Plan.

Retaining walls: I note that there would be a retaining wall along the east boundary. I am concerned at the potential to have a poor relationship with the adjacent land and development to the east. Appendix 6 Earthworks Plans, shows the location of retaining walls but does not give the height for each. There would be extensive retaining, evidently associated with creating a stepped/terraced approach to the residential sites. Please provide retaining wall heights for all proposed retaining, and please show spot levels for the land adjacent to the east, and some cross sections.

F Sedges: Parks department will have input. (Desirably Chris Ferkins). It is desirable that the Carex species locally natural to Waitakere City be used. Carex comans is not natural to this area. I would suggest Carex lessoniana, C lambertiana, C dipsacea, C secta (Refer 'Carex in Auckland A Field Guide' by Chris McKain).

There is an area of native vegetation, kanuka dominant, on the east bank of the stream, and west of units 2c and 5c-4c. A proposed driveway and pedestrian path is shown within this area. Further detailing as to the locations of the trees, and with regard to the path and driveway and whether there would be any retaining or works within the driplines is needed for this area.

Gordon Griffin  
Landscape architect. W.C.c. 24.7.2006.

-----Original Message-----

From: Felicitas Dhliwayo  
Sent: Monday, 24 July 2006 9:41 a.m.  
To: Gordon Griffin  
Subject: FW: Landscape design for West Coast Road

FYI

-----Original Message-----

From: Matthew Paetz [<mailto:matthew.paetz@babbage.co.nz>]  
Sent: Friday, 21 July 2006 10:17 a.m.  
To: Felicitas Dhliwayo; [matthew.paetz@babbage.co.nz](mailto:matthew.paetz@babbage.co.nz); [bd.nzhf@xtra.co.nz](mailto:bd.nzhf@xtra.co.nz); [rientjes.consult@xtra.co.nz](mailto:rientjes.consult@xtra.co.nz); [fhc@babbage.co.nz](mailto:fhc@babbage.co.nz); [ian.petty@babbage.co.nz](mailto:ian.petty@babbage.co.nz); [stas.louca@babbage.co.nz](mailto:stas.louca@babbage.co.nz)  
Subject: Landscape design for West Coast Road

Conditions:

**Landscape Development within Private lots:**

Landscape development on private lots including framework planting shall be as per the landscape Master Plan and Typical Garden Layout, Drawing LSP-01 Rev C and LSP-02 Rev C, both dated 16.06.06 and Street Tree Planting Plan 1 of 2 Drawing LSP-05 Rev B, and Street Tree Planting Plan 2 of 2 Drawing LSP-06 Rev B both dated 15.08.06 by SOUL Environments and the 'Additional information on proposed planting' Rev C, received at Council 16 October 2006, and shall be established to the satisfaction of Council's Environmental Monitoring Officer, Resource consents.

On site planting for each private lot shall have the framework tree planting and fencing as per the afore-cited plans and shall have lawn areas, gardens, paving and other site features, in general accordance with the 'Typical Planting Plan House Type 4A, dated 7.08.06 and 'Typical Garden Layout House Type 4B' dated 16.08.06 plans and associated planting schedule by Soul submitted with the application, and shall be to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents.

Grassed areas shall be manually graded to be flush with adjacent paved or retained areas and, in association with garden areas, shall be prepared prior to occupation of units and establishment of any proposed fencing. Fences and gates shall be set in place following final forming of ground levels including grassed areas. Garden areas and grassed areas shall be good quality topsoil or garden mix (50:50 topsoil and compost), weed and debris free to 400mm minimum depth and shall be to the satisfaction of Council's Environmental Monitoring Officer Resource Consents.

Planting shall be set in place in the first planting season (May till 7<sup>th</sup> September) following use of each dwelling unit to the satisfaction of Council's Environmental Monitoring Officer, Resource Consents. If the development is staged then the landscape development including planting shall be staged accordingly.

Any tree planted within a grass area shall be within a 600mm diameter weed and debris-free garden area with a woodchip mulch to 60mm depth, and with two marker stakes 50mm x 50mm x 1.2m per tree (ties not required).

Lawn areas and gardens shall be watered as necessary to facilitate establishment, and with gardens kept weed free on an ongoing basis for the first two years following initial planting, to the satisfaction of the Environmental Monitoring Officer, Resource Consents. Any tree or plant that dies, is removed or otherwise fails to establish shall be replaced the following planting season and shall be maintained for a further two years to the satisfaction of the Environmental Monitoring Officer, Resource Consents.

*Jodie Mitchell*  
*Planning Consultant*

**PARKS ASSESSMENT FOR COMBINED LAND USE SUBDIVISION  
RESOURCE CONSENT AT 423-429 WEST COAST ROAD, GLEN EDEN**

---

**To:** Felicitas Dhliwayo  
Resource Planner

**Cc:** Renee Lambert  
Service Manager, Parks Planning

**From:** Jodie Mitchell  
Planning Consultant

**Date:** 16 October 2006

**Site Address:** 423-429 West Coast Road, Glen Eden

**Resource Consent No:** RMA 20061077 / SUB 20061078 / SPW22816

**Zoning:** Human Environment - Living  
Natural Environment – General & Restoration  
Riparian Margin 7m  
Non-Riparian Stream

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**1.0 PROPOSAL**

The vacant subject site of 5.738m<sup>2</sup> is located on the northern side of West Coast Road.

77 units are proposed made up of detached, semi-detached, and apartment building designs varying from 2- 5 bedrooms. The applicant is the New Zealand Housing Foundation their aim is to provide affordable housing for people who may not otherwise be able to own their own home together with rental housing.

The site is an irregular elongated shape. The irregularity is influenced by the western boundary which, with the exception being the southern end, for the most part approximates the course of Parrs Stream. The southern end includes land that will also have road frontage to the subdivision accessed by Albionvale Road on the opposite side of the stream. The land to the west contains an older residential subdivision developed over the last ten years and is accessed from Woodbank Drive.

Generally, the site slopes down towards Parrs Stream which passes through the site from north to south. The most level portion of the site is at the northern end. The stream is the main natural feature of the site and creates the setting. A 7 metre Riparian Margin applies to the watercourse.

The area surrounding the watercourse is to be set aside as drainage reserve. A walkway will be provided along the eastern side of the stream. A footbridge will provide pedestrian access

across the stream from the Albionvale Road subdivision. A drainage reserve at the northern end of the development will provide an additional reserve area.

Some earthworks and vegetation removal have been undertaken leaving the majority of the site is in grass, with vegetation concentrated along the Stream. The applicant proposes to clear the weed infestation and most of the stream side vegetation and provide enhancement and mitigation through native revegetation.

## **2.0 INSTRUCTIONS**

Assess the proposal in terms of the 7 metre Riparian Margin, the proposed reserves, General Natural Area and Restoration Natural Area. Provide conditions where relevant.

## **3.0 STATUTORY CRITERIA**

For consideration in this assessment are the rules relating to:

### **1.0 Natural Areas – Riparian Margins**

Statutory Criteria District Plan Rules #1

The 7 metre Riparian Margin relates to the western portion of the subject site. Riparian Margins are particularly sensitive to the adverse effects of use and development. The role of these areas is to ensure that ecological buffers are created beside natural water systems. Further by preserving the natural character of these areas natural hazards can also be mitigated against.

The Riparian Margin relates to a watercourse in its natural state meandering through the lowest points of the site. The following assessment looks at the preservation and enhancement of the Margin in relation to the proposed development and the effect on vegetation and the wider ecosystem.

### **2.0 Outline of Vegetation Removal Works**

The applicant proposes to remove weed species together with native and exotic vegetation within the Riparian Margin. While some native vegetation is worthy of retention and compatible with the development, the majority of vegetation will be removed. The areas of weed infestation, rough pasture land, unsuitable species and corresponding removal is shown on the plan prepared by Willy Coenradi "Housing Foundation HZ, West Coast Road Development (Part of 423-429 West Coast Road) vegetation and major features, Sheets 1 & 2", dated 12 June 2006 drawn by, and is attached in Appendix 7 of the application. Weed species scattered throughout the Riparian Margin include woolly nightshade, willow, privet, salix caprea, and climbing honeysuckle.

Trees and vegetation to be retained include:

- a) a mature totara and area of mature native revegetation highlighted as #4 and #5 on the above referenced plan
- b) a large Kahikatea, on the western side of the stream towards the northern end reference #7
- c) a group of naturally occurring native revegetation, referenced #6.
- d) a Cordyline australis, reference #13. The tree is located within the proposed drainage reserve at the northern end of the site.
- e) there are two existing Pear trees, located to the north of the proposed stormwater detention area at the northern end of the site. The landscape plan prepared by SOUL Environments, reference LSP-01, dated 16/06/06 shows that the northern most specimen is to be retained.
- f) the restoration area along the northern boundary which includes part of the esplanade reserve contains kanuka, Corosma Robusta, Myrsine australis and Cyathea with an understory of carex and ferns.

While it is appropriate to retain this vegetation there is a small level of weed infestation that will be removed and enhancement planting introduced. While it is preferable that appropriate existing vegetation be retained, once weed control and vegetation alteration commence on site, it may not be practicable or possible to retain vegetation referenced above. Therefore, it is recommended that a level of flexibility be afforded in this regard and that the applicant and/or their arborist assess the situation in conjunction with a WCC Council arborist or a representative thereof. Chris Boucher has been involved in the assessment phase and it may therefore be fitting, given his familiarity, to include Chris in the post approval on-site progressive assessment.

Overall, vegetation to be removed will consist of native and exotic vegetation more than 6 metres in height and / or 600mm in girth and also vegetation listed as removable and environmentally damaging plants in the District Plans appendices. It is noted that some clearance of stream side vegetation has already been undertaken towards the northern end of the stream. The arborist in his assessment notes that this related to exotic weed cover. In terms of the proposed vegetation alteration, assessment is required against the relevant criteria 2(a) – 2(t).

### **Assessment Criteria 2(a)**

In terms of the assessment criteria 2(a), the potential for sediment run-off exists through reduced vegetative filtering along the stream edges. This increases the potential for silt laden run-off that may threaten the natural ecosystem operating in the Green Network. In order to mitigate potential adverse effects in this regard, it is considered that the silt fence and dirt water diversion run-off bund as recommended by the applicant be implemented.

This aspect is also relevant in terms of safeguarding the existing trees to be retained, the applicant's arborist, Willy Coenradi in his report dated 16 June 2006, recommends that, *"suitable protective fencing, should be installed prior to any works taking place, and maintained for the duration of the project."* This recommendation will be included as a consent condition.

Until the area, particularly that on either side of the stream can be revegetated, sediment control mechanisms should be kept in place to avoid or mitigate any adverse effects in this regard.

In terms of mitigating adverse effects from vegetation alterations, it is considered that a comprehensive weed management strategy needs to be provided to the satisfaction of the Parks Consent Planner, as per condition (1) of this report. Subject to compliance with this condition together with other relevant mitigation aspects as discussed, it is considered that the vegetation removal will not adversely affect the overall resilience, biodiversity and integrity of the Green Network.

In the medium to long-term, the removal of weeds will improve the biodiversity of the Green Network. Over time water quality will be enhanced providing a more hospitable environment for in-stream native wildlife and the facilitation of an ecological corridor within the Riparian Margin will improve the integrity of the Green Network.

### **Assessment Criteria 2(b)**

Assessment criteria 2(b) is concerned with the extent to which the vegetation alteration reduces the extent, range and linkages between vegetation, fauna habitat and natural features. In this case, the natural features relates to the Riparian Margin and a small amount of vegetation that will be retained and integrated into the proposed landscaping.

Weed species included in the Districts Plan's Removable Vegetation Appendix such as willow species and Environmentally Damaging Appendix such as ginger, gorse, wattle, pampas grass are proposed for removal. These species threaten natural ecosystems and therefore the linkages between appropriate vegetation, and fauna habitat in the Riparian Margins. However,

they also provide support for the wildlife habitat and the weed management methodology will need to be staged to allow for this aspect.

Native species compatible with the riparian area will also be removed. Provided that the work is undertaken in accordance with approved weed control methodology and appropriate revegetation occurs any adverse effect in terms of the above, will be adequately mitigated.

In terms of the wider environment, to the south the stream connects to an existing stormwater pipe will flows under West Coast Road. From this point the watercourse continues in its natural form. The removal of undesirable vegetation and revegetation compatible with the Riparian Environment will assist with improving water in terms of down stream effects.

### **Assessment Criteria 2(c)**

Concerning assessment criteria 2(c) it is considered that there will be no adverse effects on the mauri (life-force) of native vegetation. This is because the native replanting proposed will result in an overall increase in the native vegetation within the Riparian Margin. Long-term this aspect together with the removal of weed species will protect and restore the mauri of the waterway.

Further the experience gained from the overall clean up of the stream will be enhanced as the Stream will be able to be viewed and therefore enjoyed to a greater extent. The introduction of a walkway along the eastern side will also result in the Stream and therefore mauri associated with it will being able to be experienced to a larger extent.

### **Assessment Criteria 2(d)**

As the area is not identified as a fisheries management area seafood gathering area, it is considered that the assessment criteria of 2(d) does not require assessment other than to comment that the removal of weeds and appropriate revegetation will have positive downstream effects in this regard.

### **Assessment Criteria 2(e)**

The applicant has requested input from iwi regarding the development and feedback is currently being awaited.

However, at this time the site is not known to contain any historical, cultural or spiritual significance, waahi tapu or significant to iwi, that would be affected in terms of assessment criteria 2(e). If relevant, any comments can be integrated into the planners report and if necessary referred to Parks for comment.

### **Assessment Criteria 2(f)**

Assessment criteria 2(f) requires consideration of the extent to which the work will adversely affect the significance or landscape or natural character or heritage value of any natural features. The vegetation removal does not involve modifying the natural slope down to the stream. Further with the exception of the stream there are no know items located within the riparian margin that would result in the vegetation removal being inconsistent with this criteria.

### **Assessment Criteria 2(g)**

Assessment criteria 2(g) does not require discussion as there are no trees notable to their species located within the Riparian Margin or site overall.

### **Assessment Criteria 2(h)**

Providing that the vegetation alteration is carried out under the supervision of an appropriately qualified and experienced arborist, an approved weed management strategy, it is considered

that the proposed vegetation alteration will not create any edge effects from wind on the existing vegetation. The vegetation to be retained within the Riparian Margin consists primarily of mature trees. Further, in order to avoid adverse effects on the vegetation to be retained, elements to be included in the methodology include staged removal and protective fencing prior to and throughout earthworks and construction phases. Spraying out of weed species within the Riparian Margin and site generally, shall be undertaken in dry periods of low to no wind to prevent spray drift.

Ongoing assessment during the alteration in conjunction with a council arborist will address any adverse effects in this regard should they arise.

As no smaller saplings sized regenerating native plants will be exposed, it is unlikely that mitigation such as sun shades clothes will be necessary.

### **Assessment Criteria 2(i)**

No identified heritage items will be affected by the proposed vegetation alteration. In terms of amenity, it is considered that overall amenity values and neighbourhood character will be improved. In general terms, assessment criteria 2(i) is satisfied as, the removal of undesirable species and appropriate restoration planting will enhance the amenity values of the Riparian Margin. Further the proposed drainage reserve along Parrs Stream will be overlooked by the adjoining Albionvale Road subdivision. The proposed planting, footpath and footbridge, as illustrated in the Landscape Master Plan prepared by SOUL Environments dated 16/06/06 Revision C and the Street Tree Planting Plan prepared by the same and dated 15/08/06 will provide a maintained, enhanced and attractive natural environment improving neighbourhood character and therefore amenity values.

### **Assessment Criteria 2(j)**

Assessment criteria (j) requires consideration of the extent to which the vegetation alteration can be off-set by restoration or enhancement. The introduction of native seedlings, saplings and specimens through revegetation will enhance the natural ecosystem of the reserve and surrounding area. Proposed revegetation has been broken into three categories, as outlined in the information provided by SOUL Environments *"NZ Housing Foundation Babbage Consultants 423 -429 West Coast Road, Henderson. Additional information on proposed planting 13-October-06, Revision C"*:

1. Higher Stream Bank Areas refer Types B and C
2. Planting on Upper Bank: Generally moist ground with high water table and occasional flooding; and  
Marginal Emergents: marsh areas and below winter water levels; and  
Lower Stream bank: ground above common water levels but subject to flooding  
– refer Type D
3. Planting in Reserves at road sides, and adjacent to boundaries – Type E.

Detail as to the spacing, planting and size is contained in the above referenced Tables on pages 1-6.

It is considered that a dense buffer of ground cover around margins such as carex interspersed with amenity natives such as Kahihatea and Cabbage appropriate.

Soul Environments have advised that all native stock planting is to be eco-sourced. A consent condition will be included in this regard.

The significance of the natural character or landscape value of the natural features is not remarkable in terms of identification by the District Plan or any other relevant documents. As

such, the removal of the vegetation as proposed will have less than minor affects on these values and the proposed revegetation will enhance amenity values and view of the site from the adjoining roads and the residential neighbourhood.

#### **Assessment Criteria 2(k)**

There are no known stability problems that would be exacerbated by the proposed vegetation alteration.

#### **Assessment Criteria 2(l)**

This criteria requires consideration of the extent to which the existing cleared areas are utilised for proposed development. In response to this, it is considered that the clearance in the Riparian Margin is not to provide for building platforms but to provide for a public walkway adjacent to Parrs Stream and clearance of weed species and planting of vegetation incompatible with the development and proposed enhancement of the Riparian area. Further, through the use of battering the proposal has been specifically designed to avoid retaining walls within the Riparian Margin. This means that the construction of buildings, with the exception of the footbridge, has been prevented within close proximity to the stream.

#### **Assessment Criteria 2(m)**

The payment of a reserve contribution together with various conditions relating to sediment control, protection of vegetation to be retained, and planting, will be effective in adequately avoiding, remedying or mitigating against any more than minor adverse effects as a result of the vegetation alteration. 61 new lots are proposed and 77 new units. There are two existing lots so a reserve contribution will be conditioned for 59 new lots.

#### **Assessment Criteria 2(n)**

The proposed vegetation alteration required in relation to the Riparian Margin is not specifically required to accommodate development otherwise permitted by the plan. The density of residential units is compatible with the Living Human Environment. The vegetation alteration within the Margin is proposed in order to provide weed eradication and enhancement of the area while protecting the ecosystem of the watercourse. The vegetation alteration has been proposed for this purpose together with the provision of a walkway adjacent to the stream, and footbridge within the Margin.

It would be invented to state that the work is unrelated to the residential development proposed and that the weed eradication and revegetation are being undertaken purely to enhance the watercourse and it's margins. However, the development does provide an opportunity to tidy up the Riparian Margin and provide vegetative and ecological enhancement concurrently with public access.

The weed eradication proposed would have been requested by WCC prior to the vesting of the Riparian Areas as drainage reserve.

#### **Assessment Criteria 2(o)**

This requires weighing up of the extent to which the vegetation alteration will adversely affect the natural, cultural and amenity values of surface water in rivers and lakes. As the proposal does not relate to these water forms this criteria does not require discussion.

#### **Assessment Criteria 2(p)**

In relation to the criteria 2(p) it is considered that there will be no more than a minor affect on water quality and aquatic ecosystem health of the stream itself or upstream or downstream, provided that the activity is undertaken in accordance with an approved Weed Management

Strategy and conditions of consent regarding sediment control. Vegetation clearance will be beneficial to the ecosystem by the removal all environmentally damaging plants and removable plants as listed in the Waitakere City Council District Plan. As noted previously, it is important given the scale of the removal that it is staged to avoid mass scale removal leaving the habitat over exposed and avoid adverse effects on water quality and the aquatic ecosystem.

The revegetation of the area will increase the ability of the Margins and Stream to provide food sources and shade thereby facilitating a healthy aquatic ecosystem.

Direct application low toxicity herbicide, such as Roundup is the preferred method for within 5m of watercourses. This will be achieved through direct application of low-toxicity herbicide treatment for large infestations on the edges of the stream, minimising soil disturbance while also presenting a low risk of spray-drift.

However, some weeds including salix do not respond as desired and in these instances, the applicant proposes to use more effective herbicides, such as Escort. As with Roundup, direct application will minimise harm to non-target vegetation and potential for water contamination. A condition of consent regarding a weed control plan will provide further certainty on appropriate methodology.

#### **Assessment Criteria 2(q)**

The subdivision has been designed in a manner that does not require vegetation clearance within the Riparian Margin to accommodate residential lots. The Riparian Margin will be afforded protection through the establishment of drainage reserves and enhanced through replanting. Further as noted above the much of alteration includes weed species and replanting that will be more appropriate for the stream edge and the Living Human Environment zoning which applies to the site.

#### **Assessment Criteria 2(r)**

The vegetation alteration associated with the subdivision is not primarily required to construct a stream crossing. A footbridge is proposed from a walkway from the Albionvale road subdivision on the opposite side of Parrs Steam. No significant trees will be removed to accommodate the bridge.

#### **Assessment Criteria 2(s)**

In this instance, vegetation alteration associated with the subdivision has been minimised in relation to the Riparian Margins. Existing mature trees and native regenerating vegetation have, where appropriate and possible, been accommodated into the drainage reserves.

#### **Assessment Criteria 2(t)**

The proposal represents vegetation alteration that is consistent with the *Draft Parks and Open Space Strategy 2005*. Green Linkages along streams are encouraged through the strategy which recognises that these waterways *"provide the best opportunities as key green linkage corridors"*. This Strategy is discussed in more detail in Section 8.8 of this report.

### **3.0 Rule 3.0 Earthworks**

Minor earthworks will be required to construct the footbridge and pathway along the eastern side of the Stream.

As the level of earthworks within the Riparian Margin is not significant and the natural contour of the slope will not be altered a full assessment of the assessment criteria contained in Rule 3 of the District Plan is not warranted in this report. The applicant advises that earthworks will be undertaken in accordance with the Auckland Regional Council's Technical Publication 90 (TP90). Further erosion control measures in relation to the stream specifically will include silt fencing and earth bunds. Appendix 10 of the application illustrates the proposed location of silt control fences in relation to the stream (Appendix 10 Erosion and Sediment Control Plan prepared by Babbage Consultants dated June 2006 drawing No C05 – C07). Higher up from

the stream, dirty water runoff diversion bunds are proposed. The bunds will be a minimum of 0.6m high. Babbage advises that earth bunds are more efficient at controlling sediment runoff. Further monitoring will be undertaken during periods of heavy rain to ensure that any damage is immediately rectified.

Provided that the above methodology is implemented, it is considered that there will be no adverse flow-on effects on the watercourse itself, nor upstream or downstream, as a result of the earthworks.

#### **4.0 Rule 4.0 Impermeable Surface**

An impermeable surface not exceeding 10% of that part of the site within the Riparian Margin is proposed. This is a restricted discretionary activity. The impermeable surface will consist of a pedestrian pathway along the side of the Stream. The walkway is not within the Riparian Margin for the entire length, relating primarily to the portion southwards from approximately Lot 56.

The walkway will be 1.5 metres in width, this is in accordance with section 7.3.7.12 of the Waitakere City Council Code of Practice. While the applicant advises that the path will be concrete or asphalt, under section 7.3.7.3 of the above Code of Practice, requires that all footpath concrete paving is required to be exposed aggregate. This aspect can be confirmed by a consent condition.

The impermeable surface involves modification of the Riparian Margin to provide a level surface. In relation to the Riparian Margin, it is considered that the impermeable surface meets the assessment criteria as it does not result in an inappropriate or excessive modification to the edges of a stream or a Riparian Margin.

#### **5.0 Rule 5.0 Stock**

The applicant does not propose to graze any stock on the site.

#### **6.0 Rule 6.0 Establishment of Vegetation**

A comprehensive Landscape assessment together with additional information has been provided by Soul Environments, both the Landscape Master Plan and the Street Tree Planting Plan are referenced above under Assessment Criteria 2(i) vegetation alteration. These documents confirm that the Riparian Margins and reserve areas will be replanted with a mix of native and exotic specimen trees, shrubs and under planting. As the proposal does not involve:

- 1) the establishment of vegetation contained within the Environmentally Damaging Plants Appendix of the District Plan, or
- 2) any vegetation established for woodlot or forestry purposes

the establishment of vegetation is a permitted activity.

#### **7.0 Rule 7.0 Buildings**

The proposed footbridge over the stream is defined as a building under the definitions section of the District Plan. This requires assessment of a building within the Riparian Margin.

The footbridge will be constructed in accordance with the WCC Code of Practice Standard Detail for footbridges or a suitable design as agreed by the Parks Consent Planner. Given the minor nature of the building work within the Riparian Margin, and upon review of the relevant assessment criteria, it is considered that the proposed bridge is in accordance with the criteria. This assessment can be summarised as follows:

- 1) The Green Network will not be adversely affected as the footbridge will not interrupt the flow of the watercourse, or result in discharge.
- 2) The footbridge is not of a physical size so as to reduce the extent, range or linkages between vegetation, fauna habitat, or natural features.
- 3) Amenity will not be affected by the footbridge, it will be constructed in accordance with design principles adopted by WCC through the Code of Practice.

- 4) Given the minor nature of the building work, it will not exacerbate flooding, erosion or stability problems.
- 5) The footbridge provides a valuable pedestrian link from the subdivision on the western side of Parrs Stream to the walkway along the eastern side of the Stream and also the proposed housing development.

### **8.0 Draft Parks and Open Space Strategy 2005**

There is an existing drainage easement relating to the site. This easement will become a local purpose drainage reserve.

While the *Draft Parks and Open Space Strategy 2005* looks at the wider roles and range of open spaces in Waitakere, and outlines the method for managing and developing parks, as there will be a public walkway along the stream in the reserve, a brief review to ensure compatibility is deemed appropriate.

The Strategy includes protecting the Green Network, of which the Blue Network is a part. The Strategy cites Ecowater as, *"the department of WCC that manages the City's assets and services that relate to the 'three waters' - water supply, wastewater and stormwater"*. Ecowater's role is backed by the Strategy.

On review of the Strategy and Ecowater's role, it is concluded from Parks perspective that compatibility is achieved. The drainage reserve provides for a public walkway along Parrs Stream which through required weed control and appropriate planting of the Riparian Margin will facilitate an ecological corridor along the stream edge which will:

*"Extend and enhance the City's natural ecosystems and biodiversity"*

The proposal will achieve retention of the Riparian area will also providing for development in the Living Environment. The Green Network, *"seeks to bring the natural environment closer to the everyday lives of the citizens – and particularly the urban dwellers – of Waitakere City - so they can come to know and value it"*. The subdivision results in residential development that is in keeping with this intention.

Overall, the proposal will not involve any activities that are inconsistent with the strategy for the Green Network.

### **9.0 Reserves Act 1977**

The reserve is classified as a local purpose reserve under the Reserves Act 1977. In accordance with section 23, the purpose of local purpose reserves is as follows—

*"[(1) It is hereby declared that the appropriate provisions of this Act shall have effect, in relation to reserves classified as local purpose reserves for the purpose of providing and retaining areas for such local purpose or purposes as are specified in any classification of the reserve.]"*

It is considered that the proposed subdivision will enhance public access to the Stream through the provision of a walkway and footbridge while concurrently achieving its purpose under the Reserves Act for water conservation.

### **5.0 CONCLUSION**

Provided that vegetation removal is undertaken in accordance with consent conditions together with the earthworks, and landscaping proposed, it is concluded that any adverse effects on the Riparian Margin can be adequately avoided, remedied or mitigated.

Further, the activity is in accordance with the relevant assessment criteria of the District Plan. The proposal also provides for enhancement of the Riparian Margin while concurrently providing public access and pedestrian permeability.

## **6.0 RECOMMENDATIONS**

Approval is given to the above application providing the following conditions are met:

### **SECTION 224(C) REQUIREMENTS**

- (1) Carry out the removal of environmentally damaging plants from all lots including the proposed esplanade reserve, as listed in the Waitakere City Council Proposed District Plan. Submit a Weed Control Programme to the satisfaction of the Manager, Resource Consents within 2 months of the issue of this consent. This Weed Control Programme shall be implemented on the site within 6 months of the date of issue of this resource consent to the satisfaction of the Manager, Resource Consents. The programme needs to include:
  - a) an inventory of the weed species to be removed;
  - b) removal techniques to be utilised; weed disposal methods;
  - c) time frames for work and whether the weed removal needs to be staged (particularly relevant for sensitive areas such as coastal edges or riparian margins);
  - d) any re-vegetation programme required to prevent re infestation of weeds;
  - e) an assessment of any ecological issues around the removal of vegetation;
  - f) methods for addressing stability and erosion and sediment control methods.
- (2) Enter into a registerable fencing agreement with Council in regards to Lots 23, 24, 25, and 46 – 60 to the effect that the Council will not be liable to contribute towards the cost of creating or maintaining any dividing fence between any reserve or other land vested in or administered by the Council. Also, that any fences facing the reserve shall be visually of permeable construction such as swimming pool fencing and 1.2metres maximum height in order to ensure good surveillance of the reserve, and to reduce the likelihood of graffiti.
- (3) Prior to work commencing on the site, protective fencing shall be placed around the dripline of the Totara (#4), Kahikatea (#7), Cabbage (#13), Pear (#10) and groups of native revegetation (references #4 and #6) as shown on the plan titled "*Housing Foundation HZ, West Coast Road Development (Part of 423-429 West Coast Road) vegetation and major features, Sheets 1 & 2*", dated 12 June 2006 prepared by Willy Coenradi. The fencing shall remain in place throughout the vegetation alteration, earthworks and construction stages.
- (4) That monitoring of the health of the vegetation referenced in (2) above shall be undertaken prior to the commencement of, and during the vegetation alteration, earthworks and construction stages. This monitoring shall be undertaken by an appropriately qualified arborist engaged by the applicant in conjunction with a WCC arborist to provide progressive on-site assessment of the effects of the work on the health of the Riparian vegetation.
- (5) That a silt fence and dirty water diversion run-off bund as depicted on the Erosion and Sediment Control Plan prepared by Babbage Consultants dated 23/06/06 contained in Appendix 10 of the application shall be implemented along the full length of the western side of the stream to the satisfaction of prior to Parks Consent Planner prior to earthworks or vegetation alteration commencing on the site.
- (6) Landscaping and street tree planting is to be established within the development to the satisfaction of the Parks Consent Planner. The landscaping and street tree plans prepared by SOUL Environments specifically:
  - Landscape Master Plan dated 16/06/06 Revision C Reference LSP-01
  - Street Tree Planting Plan, Plan 1 of 2 and 2 of 2, dated 15/08/06 Revision B

- Accompanying information titled "NZ Housing Foundation Babbage Consultants 423 -429 West Coast Road, Henderson. Additional information on proposed planting 13-October-06, Revision C".

are to be implemented in accordance with WCC parks guidelines and subject to the following:

- i. That the bollards along the road frontage of the drainage reserve at the northern end shall be implemented in accordance with the WCC Code of Practice Standard Detail 7.17 and 7.71. That a 3 metre chain entry for maintenance access to the stormwater pond and wetland area shall be located in an appropriate location to the satisfaction of the Parks Consents Planner.
  - ii. Street Lighting shall be implemented in accordance with the WCC Code of Practice Section 3.3.14 and Standard Detail 7.91 attached and located so as to not conflict with street tree planting.
  - iii. In accordance with Section 7.3.7.3 of the WCC Code of Practice all footpath concrete paving in the reserve shall be 1.5 metres wide and exposed aggregate.
  - iv. That the plants along the footpath adjacent to the Stream shall be low level and set back a suitable distance so as to not restrict access or visibility along the pathway.
  - v. That the parking areas provided on the streets adjacent to footpaths shall be curbed or wheel stops implemented to the satisfaction of the Parks Consent Planner.
  - vi. All plants shall be best nursery stock, healthy vigorous and eco-sourced.
- (7) The street tree planting shall be implemented to the satisfaction of the Parks Consent Planner. All plantings are to be in accordance with the WCC parks guidelines, Code of Practice and the landscape specification submitted with the Landscape Plan. An option exists for the applicant to pay Council the cost of supplying, planting and staking of street trees per plan, to carry out the planting of street trees following the completion of the building works. The cost for this would be \$153 plus GST per tree (the current contract price for supply, planting, and staking of a PB95 tree as at April 2003).
  - (8) The consent holder is to be responsible for the maintenance of all street trees and reserve landscaping for a period of two years (from the date of its certified establishment from Council) including the replacement of any dead or dying vegetation, to the satisfaction of the Parks Consent Planner. A bond, based on \$7 per sq metre per annum for gardens/shrubbery, and \$75 per tree per annum, will be required to ensure the satisfaction of this condition. The consent applicant is to advise the Parks Consent Planner of a maintenance schedule and the name of the qualified person/company responsible for the planting maintenance. Alternatively, a maintenance cash contribution may be paid, and the maintenance will be undertaken by Council. The contribution will be calculated at a rate of \$75 per tree per annum and \$7 per square metre of garden per annum.
  - (9) The details of the pedestrian footpath, footbridge and boardwalk shall be finalised at the Engineering Plan stage to the satisfaction of the Parks Consent Planner. Engineering plans for the footpath, footbridge and boardwalk shall be submitted within 3 months of the issue of this consent. All works shall comply with the Waitakere City Council Code of Practice for City Infrastructure and Land Development. The developer must advise the Parks Consent Planner of when work will commence and prior to any works being carried out. Engineering plan details shall be provided at Engineering Plan stages for the following:

- i. The exposed aggregate footpath alignment details shall be to a width of 1.5m and constructed in accordance with the Waitakere City Council Code of Practice for City Infrastructure and Land Development Standard Detail 7.102 for Parks Walkway Types attached.
  - ii. That the footbridge shall be constructed in accordance with the Waitakere City Council Code of Practice City Infrastructure and Land Development Standard Detail 7.106 for Typical Foot Bridge attached.
  - iii. The boardwalk along the stream shall be constructed in accordance with the WCC Code of Practice Standard detail 7.105 for Typical Boardwalk attached.
- (10) Ensure that the reserves are left in a condition suitable for maintenance and mowing in accordance with section 7.3 of the WCC Code of Practice and to the satisfaction of the Parks Asset Planner.

#### **FEES, BONDS AND CONTRIBUTIONS**

- (1) In accordance with sections 108(2)(b) and 108A a cash or bank guaranteed bond shall be required prior to the release of the Section 224(c) compliance certificate for any uncompleted works or maintenance required to ensure the performance of conditions (6), (7) and (8). The amount of the bond will be twice the GST inclusive estimated cost of completing or maintaining the works for the maintenance period. The bond will be prepared by the Council's solicitor at the applicant's cost and will provide, inter alia, that the liability of the holder of the resource consent will not be limited to the amount of the bond. Make this a registered bond.
- (2) Pay to the Council a financial contribution equal to 6% (plus GST at 12.5%) of Quotable New Zealand's market values, to be obtained for Lots 3 - 61 as of the date of issue of this subdivision consent (or as at the date of any subsequent re-approval of subdivision consent or at intervals of not greater than three years) for reserve purposes.

**Approved by:**

**Reviewed and Approved by:**

**Jodie Mitchell**  
**Consultant Planner, Parks Planning**

**Renee Lambert**  
**Service Manager, Parks Planning**

**Date:**

**Date:**

## **(D1) REVEGETATION CODE OF PRACTICE**

### **1.0 The importance of revegetation**

Native revegetation in conjunction with weed control often forms the most significant component of the restoration of natural areas.

As a component of the restoration process, the primary function of revegetation is the reintroduction of native plants to a site, as a means of facilitating natural ecological processes.

In addition to encouraging natural plant succession, revegetation can be utilised as a management tool to achieve a number of positive environmental outcomes including (but not limited to):

1. Buffering of vulnerable habitat or areas of high ecological value
2. Enhancing riparian margins
3. Establishing wildlife corridors
4. Reducing weed habitat (i.e. weed replacement rather than merely weed control)
5. Facilitating the eventual self-maintenance of a site
6. Providing food and habitat resources for native fauna
7. Conserving the genetic variation of common and/or local native plant species
8. Reducing soil erosion and land subsidence
9. Enhancing the aesthetics of an area
10. Increasing the size of vegetated areas and thereby reducing forest edge effects
11. Increasing the biodiversity within a site

It is important to realise that as part of the restoration process there is often a need for multiple management actions to operate in association with revegetation, in order to achieve the environmental outcomes listed above. Adequate planning is required to ensure revegetation programmes are implemented in a consistent and logical manner (see Section 2.1).

Revegetation forms an important component of the Green Network Link through enhancing, connecting and extending existing natural areas. This Green Network will help to increase biodiversity within Waitakere City by enabling a greater number of flora and fauna to inhabit the City's natural areas, which in turn will enhance the delivery of ecosystem services at both a catchment and citywide scale.

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### **2.0 Revegetation guidelines**

There are a number of guidelines that should be adhered to when implementing revegetation actions. These guidelines are covered in the following sections.

#### **2.1 Planning**

A successful revegetation project requires planning to ensure that issues, at both a site-specific and catchment scale, are addressed and a clear course of action is outlined that is logical and effective.

The first consideration relates to the appropriateness of revegetation for a particular site, as not all areas require active revegetation. In certain sites ecological restoration is achieved more appropriately through the management of the existing regenerative processes occurring therein (i.e. succession is allowed to occur naturally rather than via revegetation).

This 'hands-off' approach is appropriate when a local native seed source exists that will be adequate to recolonise the site **and** when the site and its surrounds are already forested and canopy cover occurs over the majority of the area.

In such a situation limited habitat is available for the reinvasion of weed species. It is more commonly necessary to revegetate because of the absence of a local native seed source or to prevent weed establishment.

Examples of such vulnerable environments include:

- ☐ Forest edges that require enhancement or repair to exclude invasive weeds

and to maintain a moist internal environment.

- ☐ Large canopy gaps where natural regeneration is absent and the potential for weed invasion is high.
- ☐ Creation of wildlife corridors to create or enhance linkages between isolated natural areas.

Where revegetation is deemed appropriate a planning document should consider the following:

- ☐ Goals and objectives of revegetation (see Section 1.0).
- ☐ Physical description of the site (incl. site plan, pre-planting assessment etc).
- ☐ Management issues and threats.
- ☐ Methods to achieve the goals and objectives and a timeframe for doing so.
- ☐ Monitoring methods for assessing the effects of management actions or natural change.
- ☐ Methods to allow for adaptive management as the project evolves.

## **2.2 Plant Supply and Propagation**

### **2.2.1 Ecosourcing**

Ecosourcing is an important principle of revegetation that should be understood and adhered to in all revegetation projects. The benefits of ecosourcing include the maintenance of local biodiversity/ genetic variability, the use of plants adapted to growing in local soil and climatic conditions, and a reduced threat of plant disease. The principle of ecosourcing becomes even more significant when revegetation is occurring within habitats with a unique ecology i.e. wetlands, rare/ endangered plant

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populations, sites exposed to notable climatic variables, and also when large plant quantities are involved.

All planting material used for revegetation programmes within Waitakere City is to be eco-sourced whenever practical from naturally occurring native plant populations growing as close to the proposed planting site as possible. Seed should be sourced from (in order of preference):

- ☐ The area most likely to have supplied propagules to the proposed planting area
- ☐ Down stream/ down wind
- ☐ Within the stream catchment
- ☐ Within the same habitat or acetone
- ☐ Within the same Ecological District.

### **2.2.2 Plant Propagation**

The time required to collect ecosourced seed and propagate genuinely ecosourced native plants necessitates a lead-in timeframe of between 1-2 years (depending on the species involved).

The planning stage should allow for the ordering of plants either 1 or 2 years prior to planting commencing, depending on whether the species are fast-growing pioneer species or the commonly slower growing 'forest diversity' species.

Nursery-grown ecosourced stock is preferable to transplanting 'wilding' seedlings, which have a lower survival rate.

## **2.3 Site Preparation**

Site preparation involves those actions required to prepare a site for planting. The particular approach taken to site preparation is site-specific and should be considered in the context of the intended outcome of the restoration process (see Section 1.0)

Site preparation may include the fencing of an area to exclude stock, the mechanical 'ripping' of artificially compacted soils, the establishment of a less-competitive 'cover crop', the removal of large stands of invasive plant species, and the control of invasive groundcover plant species. Effective site preparation is critical to the successful establishment of revegetation plantings, offering young native plants a period of time to establish themselves in the absence of competition from invasive

weed species and animal pests. Weeds compete strongly for light, water and nutrients and if left unchecked, can strongly compete with native plants, suppressing regenerative and ecosystem processes and damaging or removing habitat availability.

Key actions for effective site preparation involve:

☐ Maintaining where practical all existing native vegetation.

o It should be ensured that all retained vegetation is not damaged as a result of operations on site.

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☐ Removing all invasive weed species using appropriate weed control methodologies.

o Where possible herbaceous and grass species should not be controlled as their presence assists in sheltering native plantings, while preventing reinvasion of more invasive weeds. Some exotic grass species (i.e. kikuyu) however have the potential to outcompete native plantings and therefore require control.

o Where plants are to be established in areas containing kikuyu this vigorous species should initially be blanket sprayed with a Glyphosatebased agrichemical. A follow-up treatment of the regrowth should occur no later than 4-6 weeks after the initial treatment and again after 8-12 weeks. The site should then be left for a minimum of 3 weeks prior to planting.

☐ Retention of existing exotic species/ staggering weed control:

o In some situations it may be appropriate to retain some exotic and/or invasive species, such as large trees or broadleaf species, whose removal may result in more problems than their retention (i.e. soil instability, habitat vulnerable to weed infestation etc). Such species can provide for positive environmental outcomes through providing site stability, shade and shelter for regenerating native species, and roosting, nesting and food resources for birdlife.

While the removal of these canopy species will become more difficult as the area underneath is revegetated, the benefits associated with their retention commonly ensure they remain *in-situ*. In these situations the preferred long-term management strategy is to underplant the stand to encourage natural succession, and then to fell, remove section-by-section, poison standing or leave *in-situ* depending on the circumstances.

☐ In planting areas defined as erosion prone sites (in particular, riparian areas and coastal cliffs) stumps are to be left *in-situ*.

## 2.4 Species selection

There are a number of issues that should be considered in the selection of plant species for any given revegetation site. Selecting the most appropriate species will ensure a revegetation project has the best possible chance of success, whereby vegetation cover is established rapidly and natural successional processes are encouraged.

### 2.4.1 Use of pioneer/ early-colonising species – First stage

Pioneer species are those species that specialise in growing in exposed open sites that are drier and hotter than those shaded by shrubs or trees. These species are commonly used in the early stages of a revegetation project as they act as a nurse crop, which provides sheltered conditions within which other species will establish naturally or be planted at a later stage. If the nurse crop is established from wellselected, rapid growing and closely planted native plants it is also likely that weed seed germination will be reduced significantly on the establishment of canopy closure. Depending on the species selected canopy closure may occur within 1-5 years after planting.

#### **2.4.2 Use of forest diversity species – Second stage**

Where it is possible that forest diversity species will regenerate naturally within a site from local seed sources, this natural process should be encouraged and any planting proposed should be avoided or be kept to a minimum.

In those sites where the eventual cover is intended to be forest, further planting can be carried out when the pioneer canopy cover of the site has established successfully, with the objective being to imitate the second stage of. The forest diversity species planted in these later stages are those that require the protection and shade provided by colonising species.

#### **2.4.3 Ecosystem and environmental characteristics**

The choice of plant species should take into consideration a number of environmental factors such as slope, aspect, soil type and exposure (wind and salt) of a particular area.

Additional considerations in determining plant species selections include a species ability to:

- Improve land stability.
- Function as a food source for birds or insects.
- Function as a visual buffer or conversely create view shafts.
- Provide a degree of shade / sun infiltration.
- Improve the aesthetics of a particular site.

Consideration should also be given to the eventual height of plant species and their role in:

- Creating a backdrop to, or screen in front of, development.
- ☐ Posing a potential health and safety threat
- Interfering with view shafts and pathways.

#### **2.4.4 Plant size selection**

The selection of the grade/ size in which revegetation plants are to be supplied in is an important consideration in ensuring the success of revegetation plantings. A number of factors influence the grade or size of plants suitable for revegetation, including:

- ☐ Budget considerations –

Plants grown in root trainers are the smallest and therefore the cheapest grade of revegetation plant suitable for planting out.

- ☐ Environmental tolerances –

As a general principle smaller plants are more tolerant of the environmental extremes experienced during establishment as they quickly recover from the stress of planting.

- ☐ Site logistics and accessibility –

Where site access is limited or restricted then smaller grade plants will be significantly easier to transport to and within planting areas.

- ☐ Availability from nurseries –

Specialist wholesale native plant nurseries often only grow large quantities of revegetation plants in Hillson root trainers, which are efficient to produce and require less space in the nursery. Several nurseries are also utilising 'plug' sizes that are commonly too small for planting out.

As a general rule it is recommended that forest diversity species be sourced from nurseries as either Pb 3's or Pb 5's. Colonising species should be sourced as either Pb ¾ or Pb 3's, with the exception being manuka, kanuka, toetoe and karamu, which may be sourced as root trainers (although Pb ¾'s are preferable).

To minimise the need for ongoing follow-up maintenance work the optimal plant size for revegetation is a Pb 3, as the establishment rates from this grade of plant are rapid.

#### 2.4.5 Plant quality

All planting material should be sourced/ supplied as first class nursery-raised stock, true to name and type, free from pests and disease, and with a shoot to root ratio of between 3:1 and 5:1. Shrubs and trees should have a solid basal stem and sedges and grasses a solid cluster of stems/ sheaths. Plant stock should not be produced from cuttings, via the cultivation of hybrids or from seed whose source is unknown. Plants should be hardened-off for at least 4 weeks prior to pick-up/ planting, in order to better cope with the climatic conditions of exposed revegetation sites.

#### 2.4.6 Plant density

Plant density is dependant on plant size and the requirements of a particular site. A planting density of 1m centres (equivalent of 10,000 plants per hectare) is preferable in order to achieve the rapid establishment of native vegetation cover and a reduction in competition from grass and weed species. A 1m planting density is common for most small to medium sized shrub and tree species. For large-scale projects a planting density of 1.5m (equivalent of 4,444 plants per hectare) is often adopted to ensure the project is not cost-prohibitive.

Certain species need to be planted at a greater density to ensure that effective ground cover is achieved e.g. . For example fern, rush and small sedge species should be planted at 0.5m centres (equivalent of 40,000 plants per hectare) Species intended as forest diversity species should be either spaced at least 5m centres throughout the site, or planted in groups to reflect the natural functioning of a species i.e. 'pole' kahikatea.

It is recommended that the majority of species should be planted in groups (for example 3-5 of the same species) rather than individuals scattered across the site. This will ensure the overall effect appears more natural, while helping provide linkages to the Green Network and also aiding in attracting fauna to the site.

#### 2.4.7 Timing of planting

It is recommended that the most appropriate time for planting in the Auckland region for most plants is during the months of May-July. In these months the temperature of the soil has not dropped significantly and plant roots are given the opportunity to establish prior to the onset of spring growth.

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It is best to concentrate on planting pioneer species first as these species will act as a nurse crop that will shelter other species that can be introduced later, or that may establish naturally.

In a artificial wetland scenario plants tolerant of standing water must first be planted in moist conditions before becoming flooded. The most suitable time for planting these species is late summer, when water levels are lowest. This is particularly important for nursery grown species that have not been subjected to waterlogged conditions.

Timing of planting post-weed control should take into consideration the residual period of the herbicide(s) used during weed control/site preparation. Certain herbicides (i.e. Metsulfuron) may require a timeframe of 3 months to elapse prior to the commencement of planting to ensure that the residual effects of herbicide do not affect plant establishment or growth.

#### 2.4.8 Fertiliser

Fertiliser can be used and is recommended in areas containing poor soils, particularly where planting is undertaken on areas that have undergone earthworks and topsoil has been removed, or where mature stands of *Pinus/ Eucalypts* species have been growing.

The best means of fertilising is to use slow release tablets (preferably of a balanced N: P: K product) dropped into the planting hole during planting, ensuring in doing so that there is soil between the fertiliser tablet and the plant roots. If slow-release fertiliser is to be applied in riparian zones, it should not be used within 5m of the water's edge to avoid eutrophication of the waterway. This is also the case in wetland

plantings.

#### **2.4.9 Maintenance**

To ensure the successful establishment and long-term viability of an area of revegetation it is important to ensure a significant percentage of the projects costs are assigned to the maintenance of the revegetated area.

Maintenance tasks should include the following:

#### **2.4.10 Weed control**

A relatively intensive programme of weed control will be required until canopy closure is established to prevent young plants being overgrown and out-competed.

Maintenance will therefore focus primarily on ensuring the survival of the planted species via weed control. Post planting weed control should have two broad objectives.

- ☐ The first objective is to minimise the competition between the invasive/competitive weed species and the plants through regular plant releasing.
- ☐ The second objective is to control/ remove any invasive weed species that invade the revegetation areas or the remaining forest remnants.

#### **2.4.11 Pest control**

Pests such as rabbits, hares, possums and goats may need to be controlled where they will negatively impact the survival of revegetation plantings.

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#### **2.4.12 Monitoring**

It is important to establish some form of monitoring practice to gauge the effectiveness and success of a native revegetation project. Comparisons between years will allow a qualitative assessment of the effects of weed control on weed infestations and native regeneration within an area, as well as the growth and survival rates of plantings. Monitoring also ensures the aims of the revegetation process are being met, while helping to identify any new management issues that may arise, such as the need for follow up weed control and enhancement planting. There are a number of options for monitoring, from the recording of revegetation 'stages' on an map, to the establishment of photopoints and permanent vegetation plots.

Photopoints are a series of photos taken through time from the same location. This method qualitatively records the change in the abundance and composition of exotic and native species at a particular site. Photopoints can be set up before weed control and/or operations commence, and re-taken annually. Comparisons between years will allow a qualitative assessment of the effects of native regeneration within the revegetation area as well as the growth and survival rates of plantings. It is recommended that permanent markers be installed and sites recorded with GPS to aid relocation of photopoint sites.

It is also possible to set up a series of permanent monitoring plots to provide for the more accurate monitoring of the vegetation (e.g. species abundance), within a revegetation site. This is however a more time consuming method that is only recommended if time and resources allow.

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### **3.0 SITE SPECIFIC REVEGETATION GUIDELINES**

#### **3.1 Revegetation in Riparian Zones**

*Where riparian margins are being revegetated the ARC publication entitled "Riparian*

*Zone Management" (ARC Technical Publication 148, June 2001), should be used as a reference for riparian planting.*

Riparian revegetation aims to establish continuous healthy vegetation cover that will: inhibit the re-establishment of weeds, provide an effective buffer against runoff; an increase in stream habitat quality and diversity; and increase in the structure and

diversity of habitat adjoining the streamside.

The revegetation of riparian zones requires an understanding of the different zones within a typical wetland/ stream cross-section and the plant species suited to each zone. Plants need to be placed in the appropriate conditions so that they can survive, thrive and serve their inherent functions.

When planting in a freshwater or saline riparian zone key considerations are the topographical position in relation to the wetland/stream profile and substrate. These factors determine the combination of the planting medium and the amount of soilmoisture present. With this in mind the site should be divided into revegetation planting units of similar characteristics as illustrated in Figure one.

**Figure one Location of each riparian revegetation zone in relation to each other (Source: A Beginner's Guide to Wetland Restoration, Greater Wellington Regional Council, 2003).**

### 3.1.1 Buffer width

A buffer width of at least 10m wide either side of the waterway is recommended to achieve a positive outcome for the aquatic environment (ARC, 2001). Such a buffer allows for indigenous vegetation succession and should result in a relatively lowmaintenance riparian zone/ wetland. Edge effects mean that the outer 1-2m of the buffer is still likely to suffer from reinvasion of weed species. These weed species will

Moist Soil Swampy Standing water  
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spread into the interior of the planting zone wherever canopy gaps occur and provide justification for follow up of all initial weed control works to help maintain low/zero density weed populations in an area.

### 3.1.2 Site-specific riparian planting notes

□ Plants tolerant of standing water, including rushes and sedges must first be planted in moist conditions before becoming flooded. The most suitable time for planting these plants is near the end of summer, when water levels are lowest. This is particularly important for nursery grown species that have not been subjected to waterlogged conditions.

□ When planting in areas of saturated soil build low mounds (20-30cm) to plant the young plants on. This will keep their roots above water until they have become used to the local conditions.

□ Avoid planting the riparian margin completely as this impedes the natural flight path of waterfowl. Use low growing species near the water's edge, with occasional tall trees over hanging the water and some gaps to provide waterfowl with escape cover.

□ As the provision of views and physical access to streams and waterways is desirable, some areas need to have low planting/grasses only and vegetation gaps need to be left at appropriate intervals and locations in order to maintain access and views.

□ Each plant should be pegged (weed mat pin or similar) to prevent uprooting by birds or moving water. These should be removed once plants are established.

## 3.2 Revegetation in coastal zones

*Where coastal zones are being revegetated the ARC fact sheet for 'Coastal Plantings' should be referred to for additional information.*

The land margin bordering the sea represents a unique and sensitive environment and the vegetation in this zone has several important functions. Good vegetation cover can help to protect coastal soils and sands from being eroded by wind and water action. The natural character of the coastal environment can be conserved through the maintenance and restoration of native plant communities found within these zones. Stands of native vegetation between the beach and adjacent human development provide an important buffer, screening buildings and providing habitat for native birds and animals.

Coastal plantings have a number of different functions including:

- ☐ To improve biodiversity by: restoring threatened ecosystem types and habitats by increasing the diversity of native coastal plant and animal species and enhancing remnant vegetation. Many native birds, reptiles and invertebrates live in the coastal zone or use them as a corridor for dispersal. Larger areas of coastal vegetation frequently support a greater species abundance and diversity, thereby enhancing the long-term viability of these sensitive ecosystems.
- ☐ To help reduce erosion and improve soil stability by dewatering soil and increasing soil binding root mass. Vegetation buffers are less expensive than engineered erosion management options. Some native plants are better designed to stabilise foredunes, and other native coastal species are more appropriate in backdune areas, coastal forests, banks and cliffs.

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May 2006

- ☐ To improve scenic values and to enhance or restore natural character of the coastline through the use of native plants found naturally in these zones.
- ☐ Dense stands of native species can out-compete introduced weed species.
- ☐ To define public access ways for pedestrians from the land down to the beach, and to prevent people reaching cliff edges.
- ☐ To enhance desirable views and to create native gardens in coastal zones (It is important to take into account the size mature plants will grow to if you seek to preserve coastal views from properties).
- ☐ To provide shade and shelter for both regenerating native species and public users of coastal areas.

### **3.3 Revegetation in roadside zones**

Roads segment ecosystems through which they are built and may impact on the climate, air, noise, light environment, hydrology and water quality in the local area. Revegetation with native species aims to minimise or mitigate these effects on the biological and human environments. As roadsides and batters are visible to many people, they have great impact on the perceptions and values held by road users. The key short-term aim of roadside revegetation is to stabilise roadside areas against erosion and also where practical prevent the invasion of weed species. Planting of fast growing colonising species can achieve this as they have the ability to rapidly shade out weeds, thereby minimising long-term maintenance costs. These species should also be able to handle a certain degree of periodic pruning/trimming. Additional aims for roadside revegetation are to create plantings that achieve the following:

- ☐ Meet safety standards for visibility
  - o Species with a low growth habit should be used where unobstructed views are required from a safety point of view.
  - o Planting should also begin at an appropriate distance from the road edge.
- ☐ Are attractive from the road users point of view, complementing or blending into adjacent areas of native plantings (N.B. These roadside plantings will also act as corridors for bird dispersal).
  - o Use of specimen trees such as pohutukawa or kowhai may be suitable in certain situations.
- ☐ Reduce the visual, noise and dust impacts of the road on neighbours by establishing dense vegetation.

### **3.4 Revegetation in parks**

Revegetation in parks should follow the standard revegetation guidelines as outlined above in section 2.0. There are some additional considerations that should be taken into account within park environments.

#### **3.4.1 Retention of view shafts**

Low species may be more appropriate in certain park areas where it is important to retain view shafts.

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#### **3.4.2 Consideration of public safety**

Public safety should be considered for revegetation in areas of high public usage. This can be achieved through planting of low growing species and avoiding species such as flax beside tracks, which provide opportunities for undesirable individuals to conceal themselves.

#### **3.4.3 Consideration of access ways**

Plantings close to pathways or access tracks should be placed at an appropriate distance from the path/road to avoid obstruction of the accessway.



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WAIKARE CITY COUNCIL

16 OCT 2006

Waitakere City Council  
6 Henderson Valley Road  
Henderson  
Waitakere

Job Number: 42608  
MP  
13 October 2006

COPY

Attention: Felicitas Dhilwayo

Dear Felicitas

West Coast Rd (No. 423-429), Henderson  
**Further information - Staging Plans and final arborist report**

Please find enclosed 4 copies of:

- Subdivision staging plans
- Final Arborist report

Yours faithfully

**Matthew Paetz**  
**Babbage Consultants Limited**

NO WATER	
Logic Group	
Plant Services	✓
Land Services	
Copy letter & files in basket	



Wilcon Sylvan Parks and Landscape Management  
C/- Willy Coenradi  
341 Rimmer Road, RD2  
Helensville 1250  
Ph: 09-420 6455 Fax: 09-420 6456 Mobile: 021-223 8723  
E-Mail: coenradi@ihug.co.nz

8 October 2006

**Housing Foundation NZ, West Coast Road Development. (Part of 423-429 West Coast Road)**

This report should be read in context of the above application and will:

1. *Identify tree(s) and vegetation which may be affected by proposed works.*
2. *Assess condition of individual tree(s).*
3. *Assess to what extent vegetation may be affected and recommend remedial work./action with a view to minimize (potential) damage to trees)*

It is proposed to develop the above site for housing purposes with associated infrastructure and landscaping.

The proposed works and items referred to in this report are generally shown on the attached **"Housing Foundation NZ, West Coast Road Development. (Part of 423-429 West Coast Road), vegetation and major features plan 1 & 2"**.

**Note: These plans must be printed at minimum A3 size for clarity.**

In addition, this report should be submitted together with the Babbage Consultants plans Ref#;

1. **42608 C1 Rev B (Contours and Services Plan)**
2. **42608 C2 Rev B (Contours and Services Plan)**
3. **42608 C3 Rev B (Earthworks Plan)**
4. **42608 C4 Rev B (Earthworks Plan)**
5. **Landscape/Planting Plans**
6. **Retaining wall layout plan (Especially adjacent 4-6 Woodbank Drive)- to be approved by Works Arborist & WCC.**

**Summary:**

- The proposed works are located within the **General, Riparian and Restoration Natural Areas**.
- The vegetation plan has been overlaid on to the Earthworks plan for easy reference showing the cut-fill requirements.
- The majority of vegetation is located along the stream meandering through the site, and consists of areas of exotic weed growth interspersed with occasional native vegetation species. These areas are circled in **YELLOW** on the vegetation plans, and to be cleared from all vegetation.
- There are some smaller areas of more significant native vegetation to be retained including a few larger native specimen trees, and mature Kanuka vegetation. These areas are circled in **GREEN** on the above vegetation plans
- Significant individual trees to be retained are marked in **BLUE**.
- Significant individual trees to be removed are marked in **RED**.

The minor watercourse meandering through the site is designated as a **Riparian stream** (7.00m zone, joining the Upper Waikumete Stream (20m Zone) on the Northern side of the site.

The land is largely designated as a General Natural Area, with a small area along the Northern boundary of the site designated as Restoration.

### Vegetation on site

The development site is part of an area which appears to have been farmed and in pasture until recent times, and since has reverted to an un-maintained rough pasture land, with some natural streamside vegetation areas from West Coast Road joining up with an area along the Northern boundary along the Waikumete Stream which is in a relatively good condition.

The layout of the site is as per the attached Vegetation Plans and construction drawings.

It is intended to clear all vegetation from the areas circled in **YELLOW** and landscape, restore and revegetate these areas as per the attached Landscape Plans. These areas largely consist of exotic weed species and rough pasture covering in excess of 98% of these areas including species such as:

Botanical Name	Common Name
<i>Solanum mauritianum</i>	Woolly Nightshade
<i>Salix alba</i>	Willow
<i>Ligustrum</i>	Privet
<i>Lonicera</i> sp.	Climbing Honeysuckle
<i>Salix caprea</i>	Pussy Willow

Sporadic natives such as *Cordyline australis* and a few *Cyathea dealbata* can also be found in these areas. Any specimens over 6 metres in height are individually marked on the Vegetation plans.

The areas covered in **green** consist of typical streamside vegetation, but can be classified as "species poor", with the predominant species found *Kunzea ericoides* (Kanuka).

The areas marked Ref #8,9 are in this category, but have potential for "infill" revegetation planting

Area ref# 16 is part of the Upper Waikumete Stream riparian vegetation, and is of average to good quality with a good canopy cover.

Species found include:

Botanical Name	Common Name
<i>Kunzea ericoides</i>	Kanuka
<i>Coprosma robusta</i>	
<i>Myrsine australis</i>	Matipo
<i>Cordyline australis</i>	Cabbage Tree
<i>Podocarpus totara</i> (1 large specimen only)	Totara

In our opinion all areas marked in **green** include native vegetation with densities and quality to such an extent that restoration of these areas and enhancing the existing vegetation is preferable over complete clearing and replanting.

It is recommended that these areas are protected from damage during development and construction with suitable protective fencing, which should be installed prior to any works taking place, and maintained for the duration of the project.

Any specimen trees marked in **BLUE** are to be retained, any specimen trees in **RED** are to be removed.

### Protection status of the vegetation

To follow is a table indicating the protection status of the vegetation within the working area, dimensions/comments and Natural Area designation.

Ref #	Species	Comments	Natural Area	Protected in District Plan
1	Cordyline australis	4.00m H x 400mm Girth. To be removed	General	No
2	Cyathea dealbata	4.00m H. To be removed	General	No
3	Cryptomeria japonica	Up to 13.00m H x 1.10m Girth. (Hedgerow on adjoining property) Works within dripline, to be retained	General	Yes
4	Cordyline australis	Up to 8.00m H x 700mm Girth. Group of trees in poor/average condition-to be removed	General	Yes
5	Pinus radiata	Up to 14.00m H x 1.30m Girth-to be removed	General	No
6	Pinus radiata	16.00m H x 1.70m Girth-to be removed	General	No
7	Podocarpus totara	17.00m H x 1.60m Girth-to be retained	General	Yes
8	Mixed native revegetation species	Up to 12.00m in height, to be retained and enhanced	General/Riparian(7m)	Yes
9	Mixed planted revegetation species	Up to 2.50m in height	General	No
10	Mixed native revegetation species	Up to 12.00m in height, to be retained and enhanced	General/Riparian(7m)	Yes
11	Mixed native revegetation species	Up to 12.00m in height, to be cleared for re-contouring requirement and re-landscaped.	General/Riparian(7m)	Yes
12	Mixed native revegetation species	Up to 12.00m in height, to be retained and enhanced	General/Riparian(7m)	Yes
13	Cordyline australis	6.00m H x 700mm Girth	General	Yes
14	Cordyline australis	4.00m H x 500mm Girth	General	No
15	Pyrus var.	11.00m H x 1.70m Girth. Large mature fruit tree in average/good condition, to be removed.	General	No
16	Pyrus var.	11.00m H x 1.70m Girth. Large mature fruit tree in	General	No

Ref #	Species	Comments	Natural Area	Protected in District Plan
		average/good condition, to be removed.		
17	Mixed native revegetation species	Up to 12.00m in height, to be retained and enhanced	General/ restoration/Riparian(20m )	Yes

**Photos and further detail of the vegetation on site**



Photo looking towards West Coast Road consisting of mixed exotic weed species



Ref # 1&2: Photo taken towards area behind 421 West Coast Road with exotic weed species and a *Cyathea dealbata* (under 3.00m in height) and a 10-15 yr old *Cordyline australis* at appr. 5.00m in height. Both will require removal.



Ref # 3: Hedge row of *Cryptomeria japonica* just within 4-6 Woodbank Drive. A two tier retaining wall is to be constructed, with the first wall a minimum of 3.00m from the boundary. ( Well outside the dripline of these trees)



Ref # 4: A group of semi-mature *Cordyline australis* up to 8.00m in height, in generally poor condition. These trees are to be removed.



Ref # 5 Photo of *Pinus radiata* shelterbelt. These trees are to be removed.



Ref # 6, *Pinus radiata* to be removed, Ref# 7 Semi mature *Podocarpus totara*, to be retained. The latter is close to a proposed driveway access. Ensure driveway is located outside tree dripline, and protective fencing is in place during construction,



Ref # 8 Photo of area with mature native revegetation species as outlined in report. Area to be retained and fenced during construction, additional enhancement planting as per landscaping plan



Ref # 9. Small area with juvenile (planted) revegetation species < 5yrs of age. Includes *Phormium*, *Cordyline australis* and *Coprosma robusta*. This area will be within a future building lot, and all vegetation is to be removed



Ref #10, 11, 12, areas vegetated with up to 20% naturally occurring native revegetation species (*Cordyline*, *Coprosma* etc.) all under 4.00m in height, and exotic weed species (Mainly *Privet*, *Salix alba*). Much of the exotic weed cover in this area has already been cleared. It is proposed to restore areas ref #10 and 12 with native streamside vegetation in this area as per the landscape plan. The vegetation within area ref #11 will be cleared to allow for cut/fill operations ( See report detail)



Photo showing vegetation within this area shown circled in yellow on the vegetation map. Only weed species occur in these areas, except for the *Cordyline australis* (Ref #13). This area will be cleared and landscaped as per the attached plans, with

the Cordyline removed



Photo of a Cordyline (Ref #14). This tree is within the proposed access road, and will require removal but if possible should be retained and fenced during construction.



Photo of looking East from Ref #14, showing 95+% of exotic weed species such as *Salix caprea*, privet, interspersed with the odd *Coprosma robusta* and *Myrsine australis* less than 3.00m in height. This area is to be cleared, with the proposed access road from the existing housing development to be constructed on the left, and the remainder landscaped as per the landscape plans. The vegetation on the

right with mature revegetation species is within ref #17 and is not affected



Ref #15, large, old Pyrus ( Pear) tree, appr. 11.00m H x 550mm DBH in good condition. Tree is within the proposed stormwater pond area and needs to be removed. There is another large pear tree (ref #16) which will be retained.

### Impact/adverse effects on existing vegetation

As outlined in this report it is intended to either preserve areas with a good native vegetation cover present, or clear and revegetate other areas where the existing native vegetation cover is of such poor quality that clearing and revegetation is considered a more appropriate option.

The bulk of the development will take place within already cleared areas, or areas largely void of significant vegetation.

It is noted however that the large Totara tree (**Ref #7**) and other vegetation included within the area of significant vegetation marked **Ref #8** may be within a proposed driveway alignment. The driveway needs to be realigned to outside the dripline of this tree and other significant vegetation present.

### Cut/Fill operations

It is proposed to undertake significant cut/fill earthworks at the site as per the attached plans.

The earthworks will specifically impact **Ref #11**, where in order to obtain the required grades a narrow strip of vegetation will require removal. This area will be below the proposed footpath, and will be re-landscaped as per the landscape plans.

A hedgerow of *Cryptomeria japonica* (**Ref#3**) is located just within 4-6 Woodbank Drive adjoining the development site. The ground levels in this area are to be lowered by up to two metres.

In order to minimise the adverse effects of the works, it is proposed to maintain the existing levels to 3.00m from the boundary to a proposed retaining wall, at which

point the level will "step" down by 1.00m to a further retaining wall and another 1.00m step. Please refer to the construction drawings for detail.

The ground surface within the trees dripline and 3.00m wide strip along the boundary is not to be disturbed apart from weed control and re-grassing.

The lowering of the ground levels will likely influence the groundwater levels in this area, however as the trees will be at the toe of a slope from Woodbank Drive it is expected that they will receive adequate moisture to allow for normal growth and vigour.

No other significant privately owned vegetation is affected by the proposed works.

No earthworks may be undertaken within the dripline of the large Totara tree (**Ref #7**)

As can be seen on the attached Earthworks plans the adverse effects of the works on other vegetation is expected to be minor.

### **Mitigation works**

Although the adverse effects on any protected or significant vegetation is relatively minor in nature, it is proposed to implement a comprehensive landscaping and revegetation plan.

This will seek to provide a high level of visual amenity and functionality within the development, as well as restoration of the streamside native ecosystems.

It is considered that this will more than mitigate any adverse impacts of the proposed vegetation alteration which may be caused by the works, and will enhance the natural environment to well beyond its current levels.

### **Protective measures of trees to be retained**

It is proposed to erect suitable temporary fencing along the outside dripline of all vegetation (**marked blue or green**) to be retained including:

1. **All item references # 3,7,8,10,12, 16 and 17.**

This fencing shall be installed prior to the commencement of any works, and remain in place until the completion of all works, and be approved by the works arborist.

The fence shall be of such a standard that they are not easily moved/removed, and are suitable to exclude any works from these areas

No (earth)works are to be undertaken within these areas, and no machine access or storage of materials permitted

### **Assessment of vegetation using the General Natural Area Criteria**

Rule Ref #	Description	Assessed effect
2a	The extent to which vegetation alteration adversely affects amenity values and neighbourhood character	The removal of weed species and subsequent revegetation of affected areas will improve amenity values and neighbourhood character to well beyond existing levels.

2b	The extent to which the vegetation alteration will threaten natural ecosystems	The removal of the weedcover could potentially cause erosion runoff into the stream. This will be addressed as part of the main Resource Consent application for the proposed works
2c	The extent to which vegetation alteration creates, contributes to or exacerbates stability problems	Nil
2d	The extent to which development is located or can be designed in a way that avoids the need to remove vegetation, and in particular the removal of any trees which are notable examples of their species	It is proposed to where possible locate any development outside any areas of significant or protected vegetation.
2e (A74)	<p>The extent to which vegetation alteration is necessary:</p> <ul style="list-style-type: none"> <li>• To accommodate development otherwise permitted by the plan</li> <li>• To ensure the safety or integrity of existing development by the plan</li> <li>• For pruning to provide light</li> <li>• For pruning to preserve public views</li> </ul>	The works are proposed To accommodate development otherwise permitted by the plan
2f	The extent to which vegetation alteration adversely affects plant health	Minor. The proposed works will require the removal of some protected vegetation, the adverse effects will however be fully mitigated as outlined in this report and attached landscape plans
2g	The effect the vegetation alteration adversely affects the historical, cultural or spiritual significance of any site or waahi tapu of significance to Iwi or archaeological site	Nil
2h	The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off the site and/ or through payment or provision of a financial contribution	The adverse effects will be fully mitigated as outlined in this report and attached landscape plans
2i	The extent to which the vegetation alteration reduces the extent, range and linkages between vegetation, fauna habitats and natural features	When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the range and linkages between vegetation, fauna habitats and natural features

2j	The effect the vegetation alteration can be offset by restoration or enhancement around and within the area subject to the application	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2k	The extent to which vegetation alteration adversely affects the significance, natural character or landscape value of any natural features	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the significance, natural character or landscape value of any natural features
2l	The extent to which the proposed vegetation alteration is for development proposed in a relative Operational Reserve Management Plan, Parks concept plan, current WCC Parks Strategy or current operative Regional Parks Management Plan	N/A

### Assessment of vegetation using the Restoration Natural Area Criteria

Rule Ref #	Description	Assessed effect
2a	The extent to which vegetation alteration adversely affects the overall resilience, biodiversity and integrity of the Green Network.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the overall resilience, biodiversity and integrity of the Green Network, as well as being complementary to the aims of the Twin Streams project.
2b	The extent to which vegetation alteration reduces the ability to create linkages between vegetation, fauna habitats or natural features and landforms.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the ability to create linkages between vegetation, fauna habitats or natural features and landforms.
2c	The extent to which vegetation alteration adversely affects the significance, natural character or landscape value of any natural features.	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the significance, natural character or landscape

		value of any natural features.
2d	The extent to which trees which are notable examples of their species can be retained..	It is recommended that several large significant native and exotic trees are retained as part of the development. No notable trees are proposed for removal.
2e	The extent to which vegetation alteration adversely affects the mauri (life force) of native vegetation.	Nil
2f	The extent to which vegetation alteration adversely affects heritage or amenity values.	When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve amenity values.
2g	The effect the vegetation alteration can be offset by restoration or enhancement around and within the area subject to the application	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2h	The extent to which vegetation alteration creates, contributes to, or exacerbates stability problems.	Minor in the short term only, the proposed restoration and enhancement of the streamside vegetation areas when complete will fully mitigate any stability issues.
2i	The extent to which the proposed development could be positioned on any area of the site within a General Natural Area.	The proposed development, wherever possible will be located within a General Natural Area
2j	The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off site and/or through payment or provision of a financial contribution.	Comprehensive restoration and enhancement of the natural areas and stream sides is proposed as part of the development
2k	The extent to which the vegetation alteration adversely affects plant health.	Minor. The proposed works will require the removal of some protected vegetation, the adverse effects will however be fully mitigated as outlined in this report and attached landscape plans

# **Assessment of vegetation using the Riparian Margin Natural Area Criteria**

Rule Ref #	Description	Assessed effect
2a	The extent to which vegetation alteration adversely affects the overall resilience, biodiversity and integrity of the Green Network	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the overall resilience, biodiversity and integrity of the Green Network, as well a being complementary to the aims of the Twin Streams project.
2b	The extent to which the vegetation alteration reduces the extent, range and linkages between vegetation, fauna habitats and natural features	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the ability to create linkages between vegetation, fauna habitats or natural features and landforms.
2c	The extent to which clearance adversely affects the <i>mauri</i> (life force) of native vegetation	Nil
2d	The extent to which clearance adversely affects the water quality of <i>taiapuri</i> or <i>mahinga mataitai</i> .	Nil
2e	The extent to which the vegetation alteration adversely affects the historical, cultural or spiritual significance of any site or <i>waahi tapu</i> of significance to Iwi	Nil
2f	The extent to which vegetation alteration adversely affects the significance or landscape or natural character of any natural features	Nil, When complete, the proposed restoration and enhancement of the streamside vegetation areas will greatly improve the landscape and natural character of the site.
2g	The extent to which trees which are notable examples of their species can be retained	N/A
2h	The extent to which vegetation alteration creates edge effects from wind or light on remaining vegetation	Nil
2i	The extent to which vegetation alteration adversely affects heritage or amenity values	The proposed restoration and enhancement of the streamside vegetation areas will have a positive effect on amenity values.

2j	The effect the vegetation alteration can be offset by restoration or enhancement around and within the area subject to the application	The proposed restoration and enhancement of the streamside vegetation areas will be undertaken within the site
2k	The extent to which vegetation alteration creates, contributes to or exacerbates stability problems	Nil
2l	The extent to which existing cleared sites are used for proposed developments	N/A
2m	The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off the site and/or through payment or provisions of a financial contribution	Extensive mitigation and enhancement plantings are proposed on site as part of the works
2n	<p>The extent to which the proposed vegetation alteration is necessary:</p> <ul style="list-style-type: none"> <li>• To accommodate development otherwise permitted by the plan</li> <li>• To ensure the safety and integrity of existing development on the site</li> <li>• For pruning to provide light</li> <li>• For vegetation alteration (other than clearance) for cultural purposes in accordance with established protocols</li> <li>• For pruning to preserve public views</li> </ul>	The proposed works are required to accommodate development otherwise permitted by the plan.
2o	The extent to which the proposed clearance adversely affects the natural, cultural and amenity values of surface waters in rivers and lakes.	The proposed works could adversely affect the natural, cultural and amenity values of surface waters. These issues will be addressed as part of the main Resource Consent application for the proposed works
2p	The extent to which vegetation alteration affects or may affect the water quality and aquatic ecosystem health of any part of the waterway adjacent to, upstream of or downstream of the vegetation alteration	The proposed works could adversely affect the natural, cultural and amenity values of surface waters. These issues will be addressed as part of the main Resource Consent application for the proposed works
2q	The extent to which any vegetation alteration associated with a subdivision can be avoided by carrying out works on parts of the site which are not in a Green Network natural area	N/A
2r	The extent to which vegetation alteration with a subdivision is necessary to construct a stream crossing.	N/A
2s	The extent to which vegetation alteration	Vegetation alteration is

	associated with a subdivision is minimised	largely limited to "low value" vegetation areas.
2†	The extent to which the proposed vegetation alteration is for development proposed in a relative Operational Reserve Management Plan, Parks concept plan, current WCC Parks Strategy or current operative Regional Parks Management Plan	N/A

**A suitably qualified Arborist will be in attendance at the following stages:**

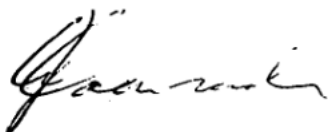
Setting out	Arborist to brief site manager on vegetation issues and RC conditions
Prior to commencement of work	Arborist to approve tree protection measures
During construction	Arborist to monitor compliance with RC conditions in regards to vegetation
Completion of construction	Arborist to check for damage and prepare completion report

**Recommended conditions:**

It is recommended that the following conditions are included as part of the Resource Consent conditions:

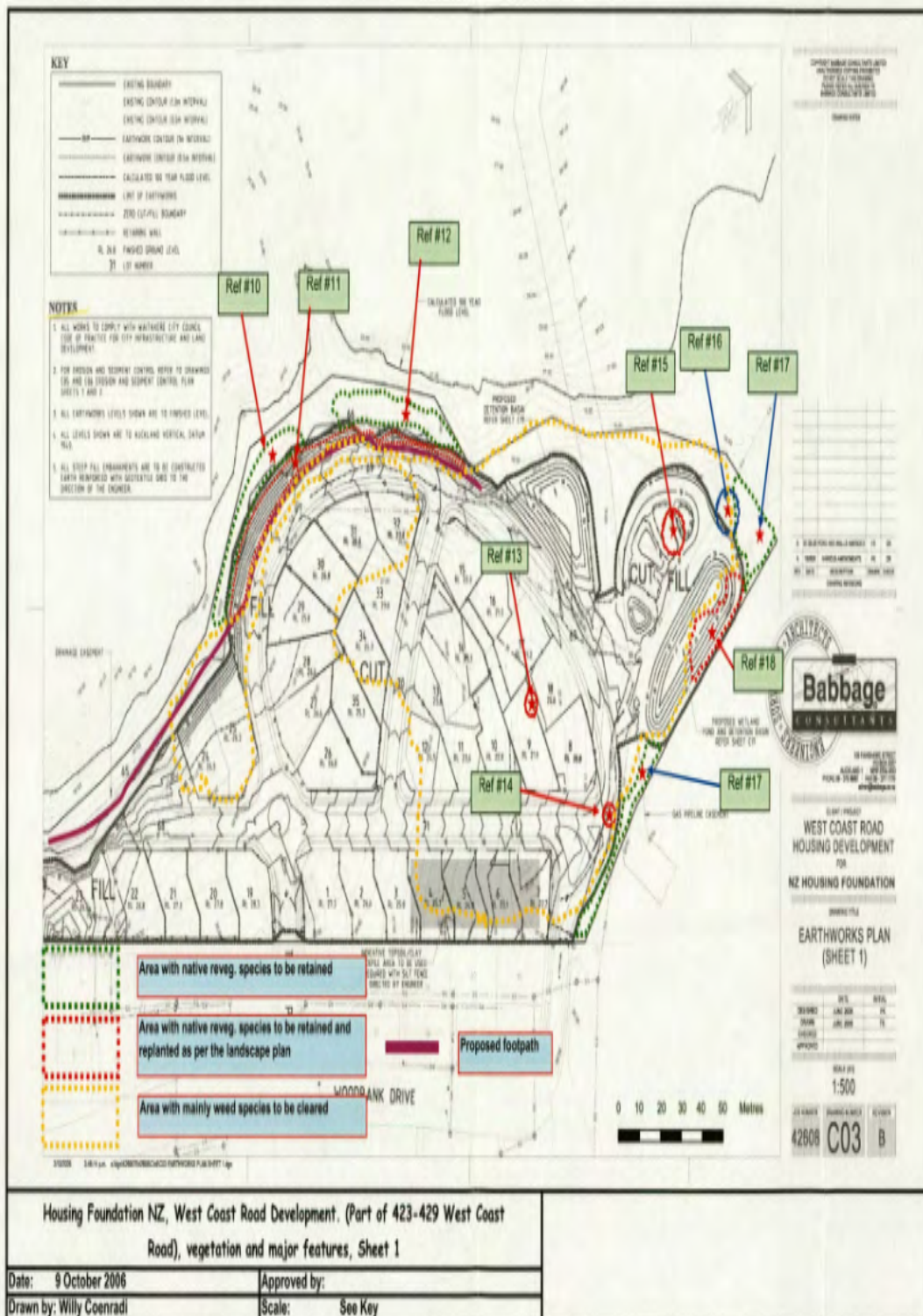
- A suitably qualified Arborist to be in attendance at critical stages as outlined in the above table.
- Area adjacent works envelope to be temporarily fenced to prevent damage to significant and protected vegetation.

Yours sincerely



Willy Coenradi.

**Wilcon Sylvan Parks and Landscape Management**





## Felicitas Dhliwayo

---

**From:** Matthew Paetz [matthew.paetz@babbage.co.nz]  
**Sent:** Wednesday, 11 October 2006 2:10 p.m.  
**To:** Felicitas Dhliwayo  
**Subject:** RE: RMA 20061078 EW Con.doc- 423 West coast Roa

HI Felicitas

yes I should have clarified. I thought there was a height infringement too, however the architect clarified that it complies. If you look very carefully you can see that the roof eave is shaded grey. Whilst cross section 16 looks like its an infringement through the middle of the roof, this is essentially an "illusion" as the hatched maximum height line applies to the building at the point of the eave Where the roof slopes up from the eave as the building gets closer to the boundary the permitted building line also rises Does this make sense?

Matt

| - - - - Original Message - - - - -  
| Subject : RE: RMA 20061078 EW Con.doc- 423 West coast Roa  
| Sent : 11 Oct 2006 14:01:35  
| To : matthew.paetz@babbage.co.nz  
| CC :  
| From: Felicitas Dhliwayo, Felicitas.Dhliwayo@waitakere.govt.nz

| Thanks for this Matthew, however you did not include Lot 56. There  
| appears to be a height infringement on that Lot as well?

| Thanks Felicitas.

| -----Original Message-----  
| From: Matthew Paetz [mailto:matthew.paetz@babbage.co.nz]  
| Sent: Wednesday, 11 October 2006 1:52 p.m.  
| To: Felicitas Dhliwayo  
| Cc: mjd@babbage.co.nz; ja@babbage.co.nz; csui@babbage.co.nz;  
| bd.nzhf@extra.co.nz  
| Subject: RE: RMA 20061078 EW Con.doc- 423 West coast Roa

| HI Felicitas

| In terms of the staging, we are in the process of preparing some plans  
| that clearly define the staging. We will forward these to you as soon as  
| they are complete.

| In terms of infringements to the maximum height control not noted in the  
| original AEE, we note that the application is also subject to approval  
| for the following infringements (we apologise for the unintentional  
| oversight) :

| Lot 9 - infringement of 250mm maximum  
| Lot 30 - infringement of 500mm maximum  
| Lot 54 - infringement of 2700mm maximum  
| Lot 55 - infringement of 3200mm maximum

| We comment on visual effects as follows:

| Lot 9  
| The effect of the infringement will be minimal. The degree of  
| infringement is minor, and the effects of the infringement will be  
| contained within the site.

| Lot 30  
| The effect of the infringement will be minimal. The degree of  
| infringement is minor, and the effects of the infringement will be  
| contained within the site.

| Lot 54  
| The proposed house on this allotment will be located approximately 45 -  
| 50m from the nearest external boundary of the neighbouring Albionvale  
| subdivision to the west. We consider that the proposed impact of the

| height infringement will be no more than minor for the following  
| reasons:

| - the western face of the "building proper" will be less than 8m in  
| height. The height infringement is a product of the topography, which  
| slopes down relatively steeply at this point. This necessitates that the  
| dwelling must be on poles. The effect of this is that the height of the  
| building, when including the poles, as measured from ground level,  
| exceeds 8m.

| However, the bulk of the building when viewed from the west will  
| essentially be that of a complying two storey dwelling, as the poles do  
| not present as a solid face.

| The topography also assists in minimising visual impact. After sloping  
| down towards the stream, the land slopes up again towards the external  
| boundary. The effect of this is that houses on neighbouring properties  
| to the west will be located on a higher contour. These factors together  
| with the substantial separation distance from neighbouring properties  
| will ensure the impact of this infringement is no more than minor.

| Lot 55

| Essentially the same comments as stated above in relation to Lot 54  
| apply.

| In conclusion we believe that these infringements will generate adverse  
| effects that are no more than minor, and furthermore no persons will be  
| adversely affected by these infringements.

| Regards

| Matthew Paetz

| - - - - - Original Message - - - - -

| Subject : RE: RMA 20061078 EW Con.doc- 423 West coast Roa

| Sent : 11 Oct 2006 09:57:42

| To : matthew.paetz@babbage.co.nz

| CC :

| From: Felicitas Dhliwayo, Felicitas.Dhliwayo@waitakere.govt.nz

| Hi Matthew

| Yes we do require you to note the extent of the infringement and an  
| assessment of environmental effects- e-mail would be fine. In  
| addition

| we would also like you to clearly outline the staging of the  
| application- what lots, roads, reserves etc to be done for each  
| stage

| (if that's the case). Please also identify any conditions (ecowater)  
| that would be specific to each stage.

| Thanks

| Felicitas.

| -----Original Message-----

| From: Matthew Paetz [mailto:matthew.paetz@babbage.co.nz]

| Sent: Wednesday, 11 October 2006 9:39 a.m.

| To: Felicitas Dhliwayo

| Subject: RE: RMA 20061078 EW Con.doc- 423 West coast Roa

| Hi Felicitas

| I understand from yesterday's meeting you require a brief assessment  
| of

| the visual impact of the three houses that infringe the maximum  
| height

| control Please confirm. Also is it OK if I set out my assessment in  
| an

| email?

| Matthew

- - - - - Original Message - - - - -

Subject : RMA 20061078 EW Con.doc- 423 West coast Roa

Sent : 11 Oct 2006 08:53:07

To : matthew.paetz@babbage.co.nz

CC :

From: Felicitas Dhliwayo, Felicitas.Dhliwayo@waitakere.govt.nz

Hi Matthew

Following the meeting yesterday, please find attached Ecowater  
comments

and conditions of consent. I will send you the Parks and  
Landscaping  
conditions once I receive those.

Regards,

Felicitas.

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Matthew Paetz

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E-mail; [matthew.paetz@babbage.co.nz](mailto:matthew.paetz@babbage.co.nz)

Web; [www.babbage.co.nz](http://www.babbage.co.nz)

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Ref: 42608 : West Coast Rd (No. 423-429), Henderson

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Ref: 42608 : West Coast Rd (No. 423-429), Henderson

Present - Babbage

Brian Donnelly

Paddy Luxford

Lorise

WCC

Jeannette

Peter Joyce

Felly

- The majority of the proposed retaining walls will be 1m high (max). However some retaining walls along the eastern boundary will be 1.7 - 2m in height.
- However the property is below the neighbouring properties - & the retaining walls will be to the south. ∴ the neighbouring properties will not be adversely affected.
- \* Recommended condition of consent - Retaining walls to be no ~~more~~ higher than 2m.
- Condition for bridge design - to be in accordance with WCC requirements
- Bldg consent to be lodged once 223C is signed off - Applicant to organise meeting with Alan Foster (Bldg)
- Street Name?
- Staging of Application - Paddy/Matthew to come back to me regarding staging & the EW conditions relating to each stage.
- Paddy/Matthew to address Height infringement on Lot 54, 55 & 56

meeting ended at 4pm.