# Balmoral Developments (Outram) Ltd

# Balmoral Subdivision Development

# Flood Hazard Taieri River

*Photo 1 Nov 2011 from north looking over site with Taieri River and stopbank running from lower left*

**19 December 2011**

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# Balmoral Developments (Outram) Ltd
# Balmoral Subdivision Development
# Flood Hazard Taieri River

## 1. Introduction

This report as been prepared for Balmoral Developments (Outram) Ltd reviewing the flood standards for the proposed development from flooding by the Taieri River.

CPG have prepared an Infrastructure Services Report for Wastewater, Water and Stormwater dated December 2011. This report is complementary to that report.

## 2. Site

The proposed 24-lot subdivision development is on the true right bank of the Taieri River immediately downstream of the Outram bridge. It lies between State Highway 87 and a stopbank that is a part of the Lower Taieri Flood Control Scheme of the Otago Regional Council. Legal description is Lot 2 DP 20759. See Figure 2.1 showing the general location in relation to the township of Outram and the Taieri River and main stopbanking system. The stopbank and adjacent land are subject to ORC Flood Protection Management Bylaw 2008. Figure 2.2 attached is a CPG plan that shows the proposed subdivision site in more detail.

## 3. Taieri River

### 3.1 Flood Standard

The Taieri River catchment is 4,705 $km^2$ down to the Outram WL recorder. While this is a large catchment the largest floods at Outram derive from the lower half of the catchment from Sutton downstream including Deep Stream, Nenthorn, and Sutton Stream rather than from the Maniototo and Styx areas. The Traquair Burn enters the Taieri R immediately upstream of the bridge and below the water level recorder and has a mean annual flood of about 30$m^3/s$ and a 1%AEP flood of 94 $m^3/s$. It is estimated that this catchment would be contributing less than 1% of the Taieri River flow when the main river peaked in a major flood and thus have no measurable effect on flood levels.

The West Taieri area had floodbanks constructed over 1870 to 1879 with major upgrades of drainage and flood protection over 1923 to 1929. After the June 1980 flood a more comprehensive approach to flooding for both East and West Taieri was taken with the first works being an upgrade of the Outram stopbanks about 1988.

The nominal design flood standard for the existing Lower Taieri Flood Protection Scheme is the 1% AEP flood event (100 year return period). In designing the stopbank upgrades in the late 1980s the adopted 1% event was 2,640 $m^3/s$. The stopbanks do have freeboard and should handle superdesign events to a higher standard.

Climate change will affect the flood standard. Mean annual rainfall is expected to increase by between 2.5 and 7.5% over the next 70-90 years (MFE: Preparing for Future Flooding 2010). Winter precipitation change could be 10-15% for the Taieri catchment by the 2080s. The simplest approach is to assume that this also applies to high intensity storm producing rainfall as well and that flood flows could increase by a similar percentage. The guidance manual recommends adjusting extreme rainfall by 8% for every one degree rise in mean annual temperature. For the Taieri catchment the projected rise in mean annual temperature by the 2080-2099 is 2°C so the recommended assessment procedure will be for a 16% increase in extreme rainfall.

### 3.2 Structural Integrity

Foundation conditions of the stopbanks were reviewed for the ORC by Tonkin & Taylor. This report "Lower Clutha and Taieri Floodbank Systems Geotechnical Evaluation – Stage 2" was issued in September 2005. On the Taieri system this focussed on the 2km of floodbank protecting Outram. The assessment was based predominantly on information gathered from a drilling programme, field mapping, liaison with ORC staff and quantitative analyses of potential failure modes.

The main objective of the study was to evaluate the structural integrity of those floodbanks with high consequences of failure. Detailed cross sections of the floodbank and adjoining land were prepared along with geotechnical characterisation to provide a quantitative assessment of floodbank performance under the design loading. The assessment assumed that the design flood level was 0.3m below the crest level until more detailed studies were completed. That flood level equates to the spillway level at the upstream end of the stopbank.

***Figure 3.1: Photo showing stopbank adjacent to proposed site at the end of Holyhead Street looking upstream***

CPG have also undertaken test pit investigations for the proposed subdivision.

There are Bylaws (ORC Flood Protection Management Bylaw 2008) that prohibit excavation over a 20m strip on the landward side adjacent to the stopbank.

The recommendations from the Tonkin and Taylor 2005 report are:

## 7. Recommendations

**General**

Remedial measures have been assessed based on selected drilling and piezometer installation in areas where there are high consequences in the event of floodbank failure. Quantitative analyses are based on preliminary design flood levels in some cases. As the hydrological studies are carried out, it will also be important to record river bed profiles adjacent to segments where the river is undercutting (bed profile steeper than 2:1, horizontal to vertical) and/or berms are absent. Also no piezometers have yet been monitored to determine responses during a significant flood. Results are therefore preliminary until the necessary verification has been carried out.

**Outram**

- No remedial work is required for slope stability of the structure.
- Review design flood levels.
- Monitor piezometers during floods or raised river levels to confirm the models, and inspect closely for piping (turbid flow).
- If the design flood level is as assumed, and the piezometers show critical gradients during flood, increase safety factors for piping using approximately 6000 cubic metres of ballast as noted above for Section D.
- Check all crossings regularly, to ensure that no localised decrease in crest height has occurred through settling and compaction (as a consequence of vehicle damage).
- Clear and re-grass the area of overgrown floodbank near the Outram Bridge and ensure batter slopes are uniform.

### 3.3 Super design Events

There is an 83m long spillway that discharges on the true right bank below the bridge. If this spillway operated the waters could impact on the proposed subdivision but the natural drainage path is to the west at this location. The spillway is only a slightly lower section of bank, 300mm lower than the design crest level of the adjacent downstream section of bank and at its upstream end tying in with higher natural ground downstream of the State Highway. This spillway level is some 1.0m above the 1980 ORC modelled flood level.

The channel capacity before spill would occur is estimated to be over 3,500 $m^3/s$. This flow is estimated to be the current 0.11% AEP (900 year return period) event or still 750 $m^3/s$ greater than the 1% AEP event for the 2080 climate change scenario. See channel hydraulics section below for the derivation of this.

The spillway is immediately adjacent to the dwelling on Part Lot 1 DP 17247. See Figure 3.2 that is a photo showing the spillway and adjacent structures.

Modelling the spillway simply as a broad crested weir the flows that could exit the main Taieri River would be about 20 to 25 $m^3/s$ before general overtopping of the stopbanks would occur. In practice the existing fence and house will act as obstructions to the flow and the spillway is not very effective.


***Figure 3.2: Photo of Taieri River right stopbank spillway section from upstream end on natural ground. 83m long extending to next gateway***

### 3.4 Flood History

Continuous records have been collected for the Taieri River at Outram (Site No. 74308) since 1968. Prior to that large floods were also noted.

ORC in the Taieri River Monitoring Report c.2000 published as table 2.8 list the largest known historic floods in the Taieri. Table 3.1 reproduces that list plus adds floods larger than 1,100 $m^3/s$ from 1968 up until October 2011.

In the ORC Taieri River Catchment Monitoring Report (99-316) the ORC noted that the 1980 flood was estimated to have a return period of 365 years. They noted that the 1980 flood plotted as an outlier from a statistical point of view and that the return period needed to be reanalysed by incorporating historic flood recorded in the analysis.

An analysis of the flood frequency incorporating the historic flows as shown in Table 3.1 has been carried out. The output of the analysis of the flood frequency incorporating those historic flows is shown as a graph in Figure 3.3. The full data on which this graph is based is attached as Table 3.2. Two plotting positions are

shown the Weibull and Gringorten. A straight line on the logarithmic scale has been drawn based on the Weibull plotting positions and represents the more conservative analysis. Based on this the 1980 flood has a return period of 145 years.

The estimated 1% AEP flood based on this analysis is 2,350 $m^3/s$. With allowance for climate change the 1% AEP flood by 2080 is expected to be about 2,725 $m^3/s$.

| Month | Year | Flood Flow m3/s |
|---|---|---|
| Feb | 1868 | 2200 |
| Feb | 1877 | 1650 |
| July | 1908 | 1400 |
| Aug | 1913 | 1250 |
| May | 1917 | 1600 |
| Jan | 1919 | 1150 |
| April/May | 1923 | 1750 |
| May | 1940 | 1800 |
| April | 1944 | 1750 |
| Feb | 1945 | 1300 |
| May | 1957 | 2000 |
| Jun | 1980 | 2526 |
| Dec | 1993 | 1467 |
| May | 2010 | 1198 |

***Table 3.1: Floods over 1,100 $m^3/s$ for Taieri River at Outram (ORC data)***

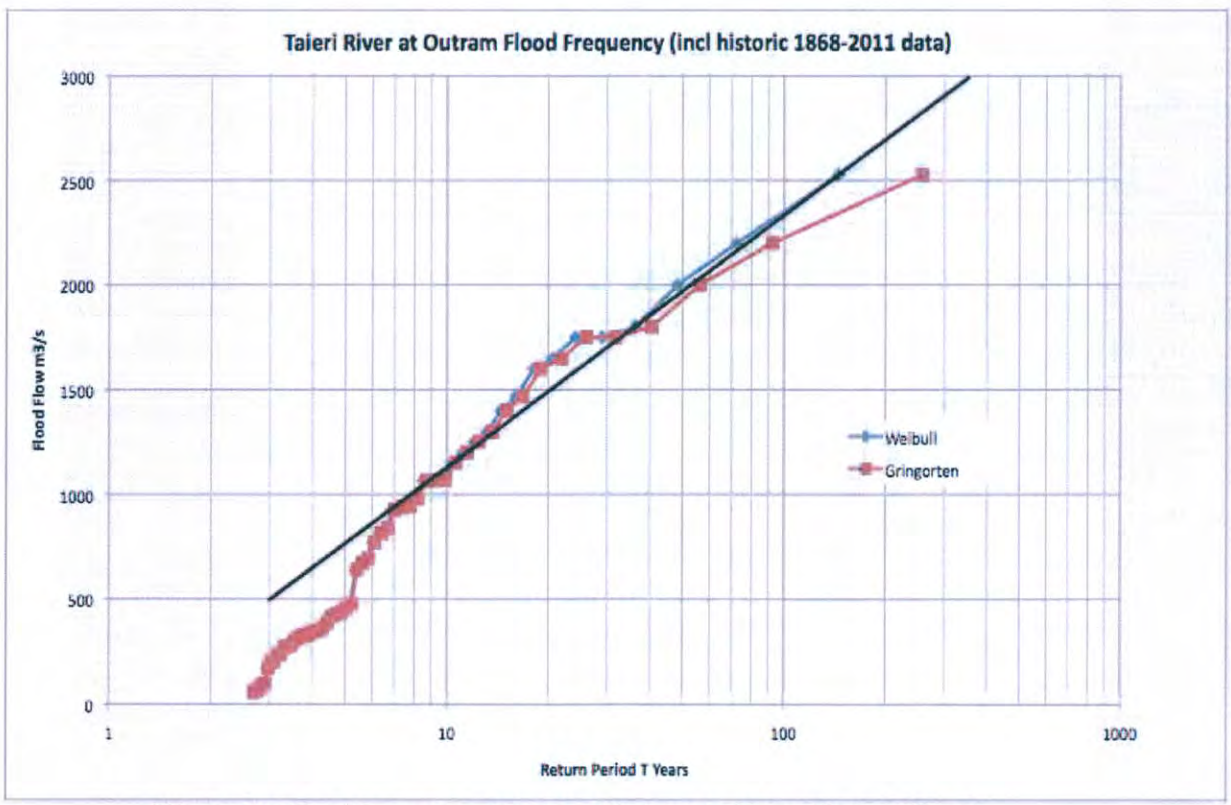


***Figure 3.3: Flood Frequency Taieri R at Outram including historic floods***

### 3.5 River Hydraulics

The ORC undertake periodic surveys of river cross-sections to use for gravel extraction management and to review the flood capacity of river channel. The last such series of cross sections has been provided by the ORC. ORC also provided a LIDAR colour plot of elevation of the area. The cross sections for modelling purposes had to be extended as the overall distance between stopbanks where they tie into the natural sloping ground is about 1.4km wide while the survey did not extend that far.

The location of these cross sections is shown in Figure 3.4 attached. It was considered not necessary to model further downstream as the spillway into the East Taieri ponding area comes into operation in larger flows.

A plot of the 1980 flood profile against the stopbank crest level is shown in Figure 3.5. This profile shows the freeboard at the defined spillway location as well as along the bank as over 1m.

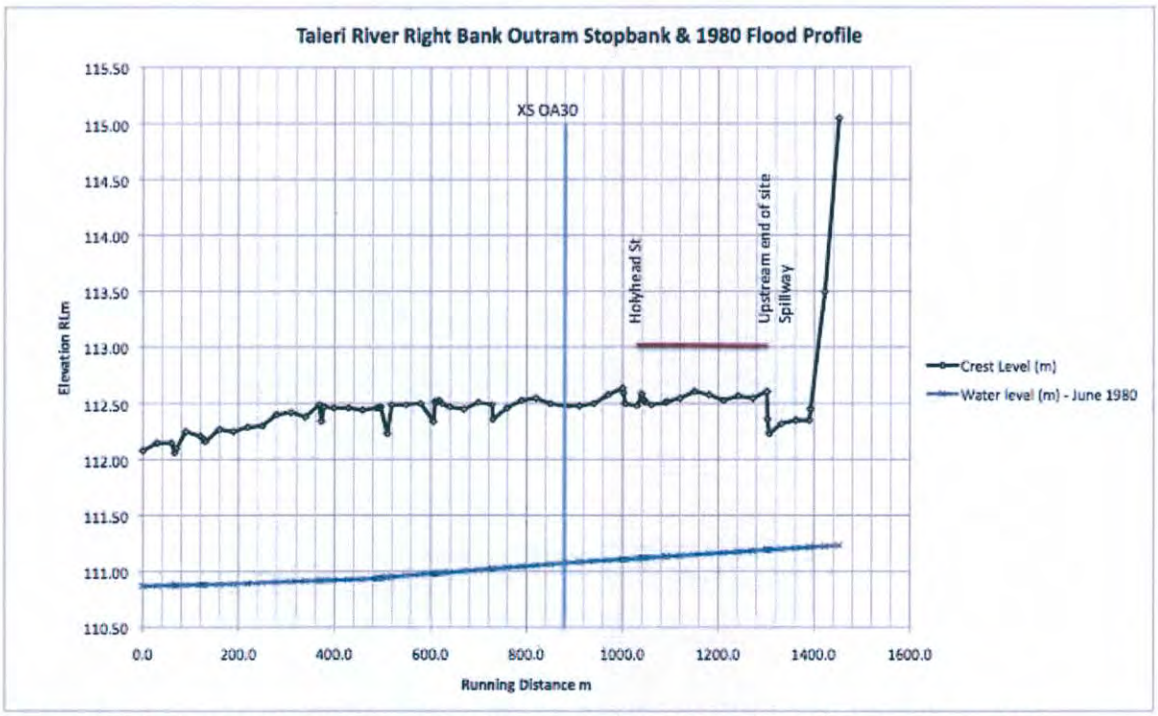


***Figure 3.5: Crest level of Outram stopbank showing the site between Holyhead St and the spillway, spillway at upstream end, and ORC provided 1980 flood water surface profile and the location of cross-section OA30 used in modelling for this report***

A hydraulic model has been set up using a USACE software programme HEC-RAS v4.1. The river cross sections have been entered and the model set up only using about 3km of the Taieri River downstream of the Outram Bridge. With the 1980 flood levels for a flow of 2,526 $m^3/s$ calibration of the model has been achieved within 0.1m. The purpose of the model is to check on the freeboard for the climate change greater flow and also the threshold when the spillway may commence to operate.

The current rating curve (elevation versus flow relationship) for the Taieri River at Outram Site 74308 is plotted and shown as Figure 3.6. This is derived from measured flows at different levels. Data has been supplied by the ORC.

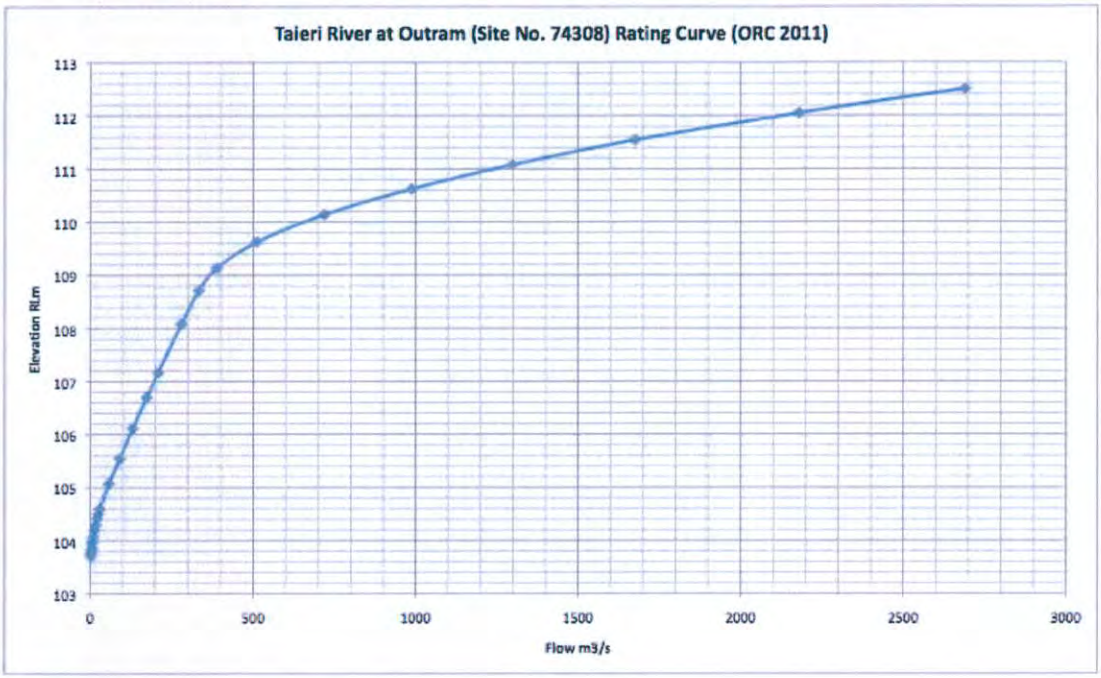


***Figure 3.6: Rating curve for the Taieri R at Outram***

The hydraulic model has been run for flows from 250 $m^3/s$ up to 4000 $m^3/s$ so that a rating curve can be plotted. The rating curve for cross-section OA30 (Model distance 5060m) is shown as Figure 3.7. The model river cross section for OA30 is shown as Figure 3.8 with water surface levels for the 1980 flood (2526 m3/s) and 3000 m3/s shown. The river long-section for the 3km reach downstream of the Outram Bridge is shown as Figure 3.8.

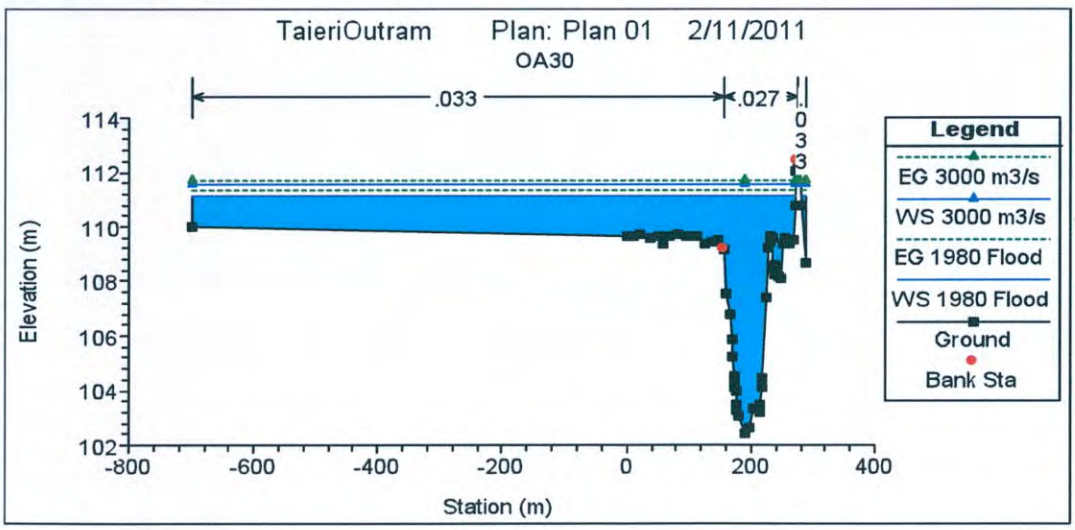


***Figure 3.7: River cross-section used in HEC-RAS model for OA30 just downstream of Holyhead St***

The model has been reasonably calibrated to the 2,526 $m^3/s$ 1980 flood profile. Mannings n roughness factors of 0.027 – 0.029 have been used for the channel and 0.033-0.035 used for the berms. It is noted that additional cross-sections would be useful between the bridge and OA30 some 500m downstream. The modelled energy line profile is considered to be realistic but the water surface profile dips as flow accelerates through the bridge reach with the water surface profile for very large floods actually modelled as being slightly lower than the immediately downstream section. This may well happen in practice but additional cross sections would refine this model. For practical consideration of the likely minimum standard provided a water surface profile with a consistent grade between OA30 (5060m) and the water level recorder site at 5970m for flows greater than the 1980 flow has been used to determine the commencement of spill flow for the spillway section. This will be conservative as the adopted water level is above the modelled level. Figure 3.7 shows the derived rating curve for the Taieri River at the spillway (5570) with the WL recorder and OA30 rating curves. The ORC modelled 2526$m^3/s$ flow was RL111.22m and the analysis for this report and shown on Figure 3.7 has the level as RL111.27m.

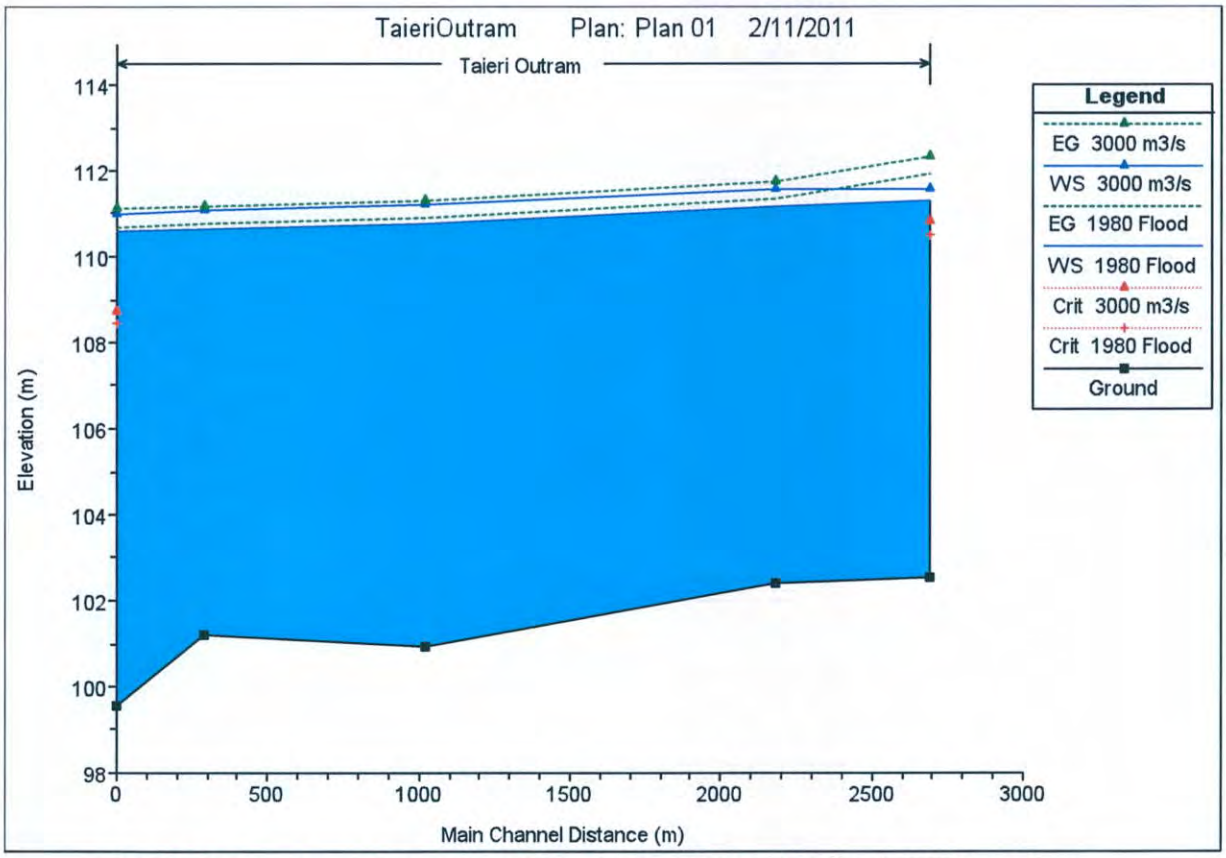


***Figure 3.8: Longsection output from hydraulic model for 1980 flood flow (2526 m3/s) and 3000 m3/s. Bridge/spillway at right***

The spillway level has a gradient with the lowest point being at elevation RL 112.23m. A simple approach to spillway capacity is to treat the spill as a broad

crested weir with no impediments. In practice the actual flow will be less as the weir is a side spill weir with the main flow continuing down the main channel, and there are obstructions immediately downstream of the weir crest by way of solid fence and dwelling. A plot of flows against elevation for the spillway is shown as Figure 3.10.

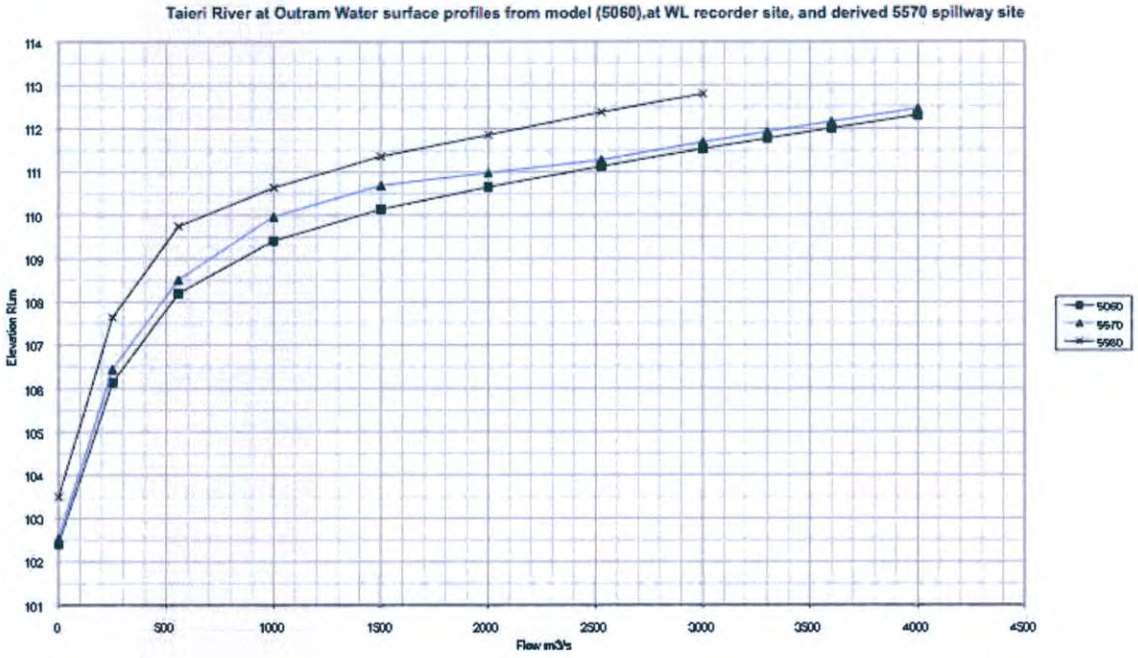


***Figure 3.9: Derived rating curve for Taieri River at spillway showing OA30 and WL recorder rating curves***

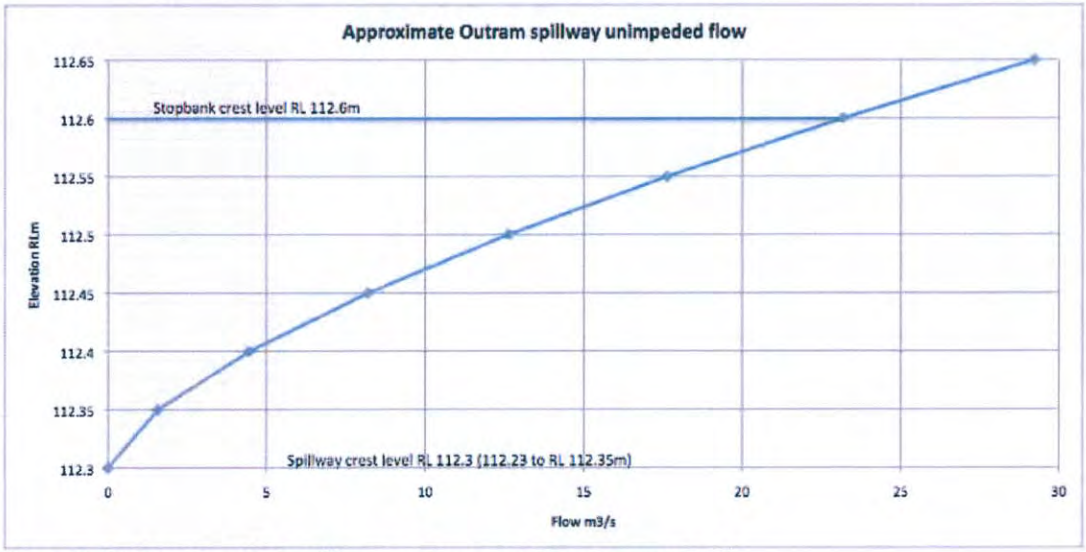


***Figure 3.10: Conservative spillway rating curve Outram stopbank***

This graph shows that without taking into account factors reducing the outflow there could be a maximum of about 20 to 25 $m^3/s$ over the spillway before more general overtopping of stopbanks occurs. Approximately 500 $m^3/s$ additional

capacity is in the main river for an increase in level of 0.3m above the spillway crest level.

## 4. Stormwater Design

The design parameters in Section 4 Stormwater in the CPG Balmoral Developments (Outram) Ltd Infrastructure Services Report December 2011 (Revision 2) have been reviewed. See Figure 2.2 attached (CPG Project 704132 Sheet SW-01 Revision A).

The proposed stormwater system is designed to ensure that stormwater flows for rainfalls up to the 1% AEP event remain at or less than pre-development flows. This is effected by provision of storage: on individual properties in the western sub-catchment, and by a collective pond in the eastern sub-catchment.

The discharge from the western area is to a scheduled drain of the West Taieri area operated by the Otago Regional Council. Discharge from the eastern area provides for options to discharge to the scheduled drain or to pump over the stopbank directly to the Taieri River. Figure 4.1 shows the drains in the vicinity of Outram. The drain at the top right of the map joins the Contour Channel and eventually discharges to Lake Waipori.


***Figure 4.1: West Taieri Scheduled Drains in vicinity of Outram (ORC 2008)***

The high intensity rainfall data HIRDS v 3 for the site has been checked and the calculations for storage volumes required to ensure peak flow rates do not exceed pre-development flow rates are satisfactory. The proposed development is at the top end of a long drainage system. The effect of the detention storage proposed is to delay the timing of the peak outflow that assists in the drain being able to cope with flows from areas without detention storage prior to receiving the peak outflow from the new development. This is operationally good for the drainage system capacity.

The option of pumping the eastern catchment pond directly to the Taieri River is preferred over pumping to the scheduled West Taieri drain.

## 5. Conclusion

The capacity of the Taieri River floodway past the site is approximately 3,500 $m^3/s$ before the spillway at the upstream end of the development site would commence operation. The 1% AEP (100 year return period flood event is currently assessed as 2,350 $m^3/s$ and with climate change is expected to increase to about 2,725 $m^3/s$. The current protection standard is in excess of a 0.2% AEP (1 in 500 year return period) flood event.

The Otago Regional Council commissioned Tonkin & Taylor to assess the stability of the stopbanks and they used water levels associated with an 0.3m freeboard that equates to the 3,500$m^3/s$ flow. Through the proposed site there were no stability issues noted although they recommended monitoring of ground water levels during flood events.

Bylaws to ensure that the ground is not disturbed close to the stopbanks were adopted by the ORC in 2008 and these have been taken into account by CPG in their subdivision design for services.

The stormwater design as proposed by CPG has been reviewed and is considered satisfactory.

There is no requirement for any additional mitigation from Taieri River flooding.

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Attachments

Figure 2.1 Location map
Figure 3.4 Cross section location map
Table 3.2 Historic flood frequency analysis summary
Figure 2.2 (A3) CPG Locality Plan & Schematic Proposal No.2

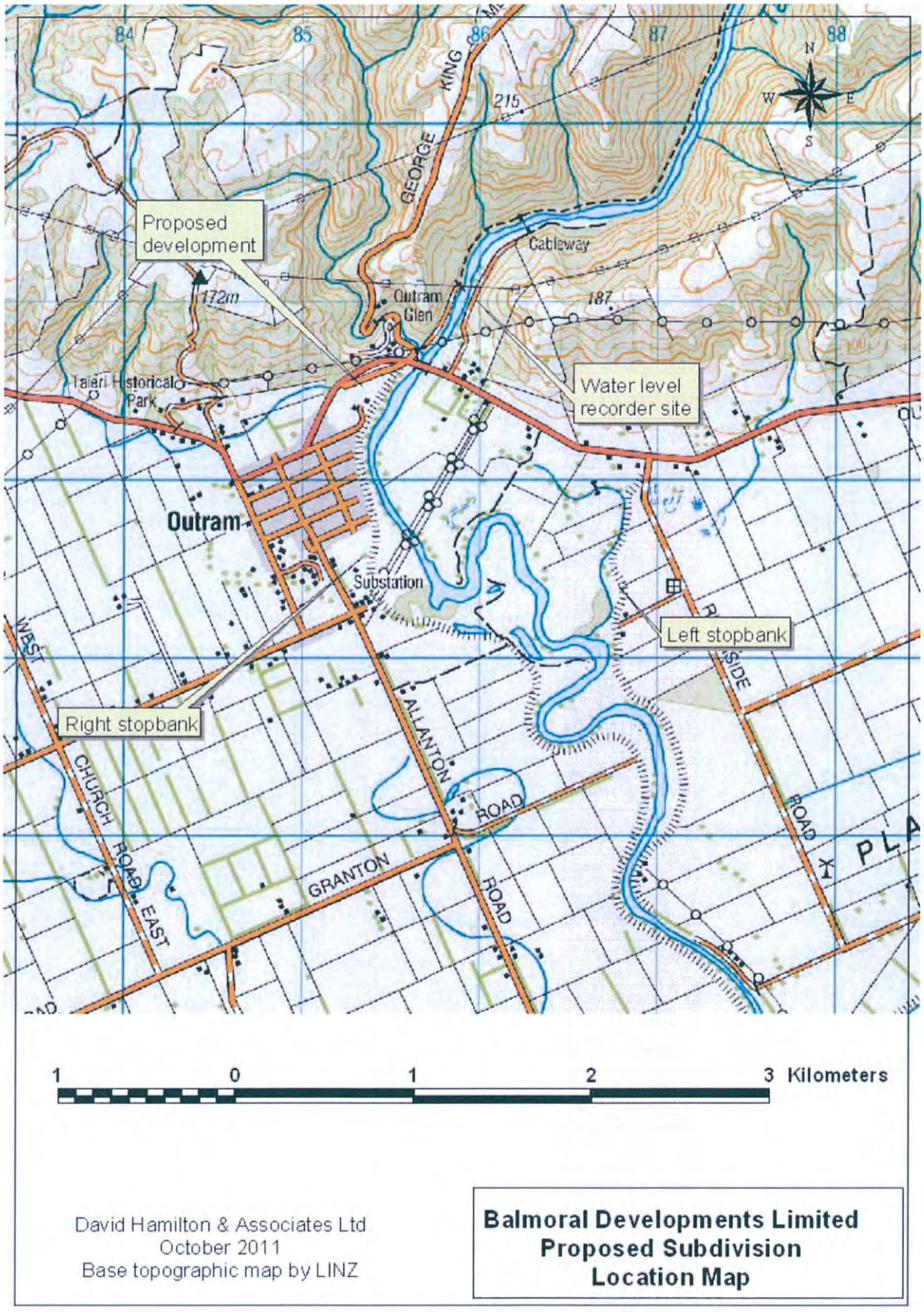



*Figure 2.1: Location Map*

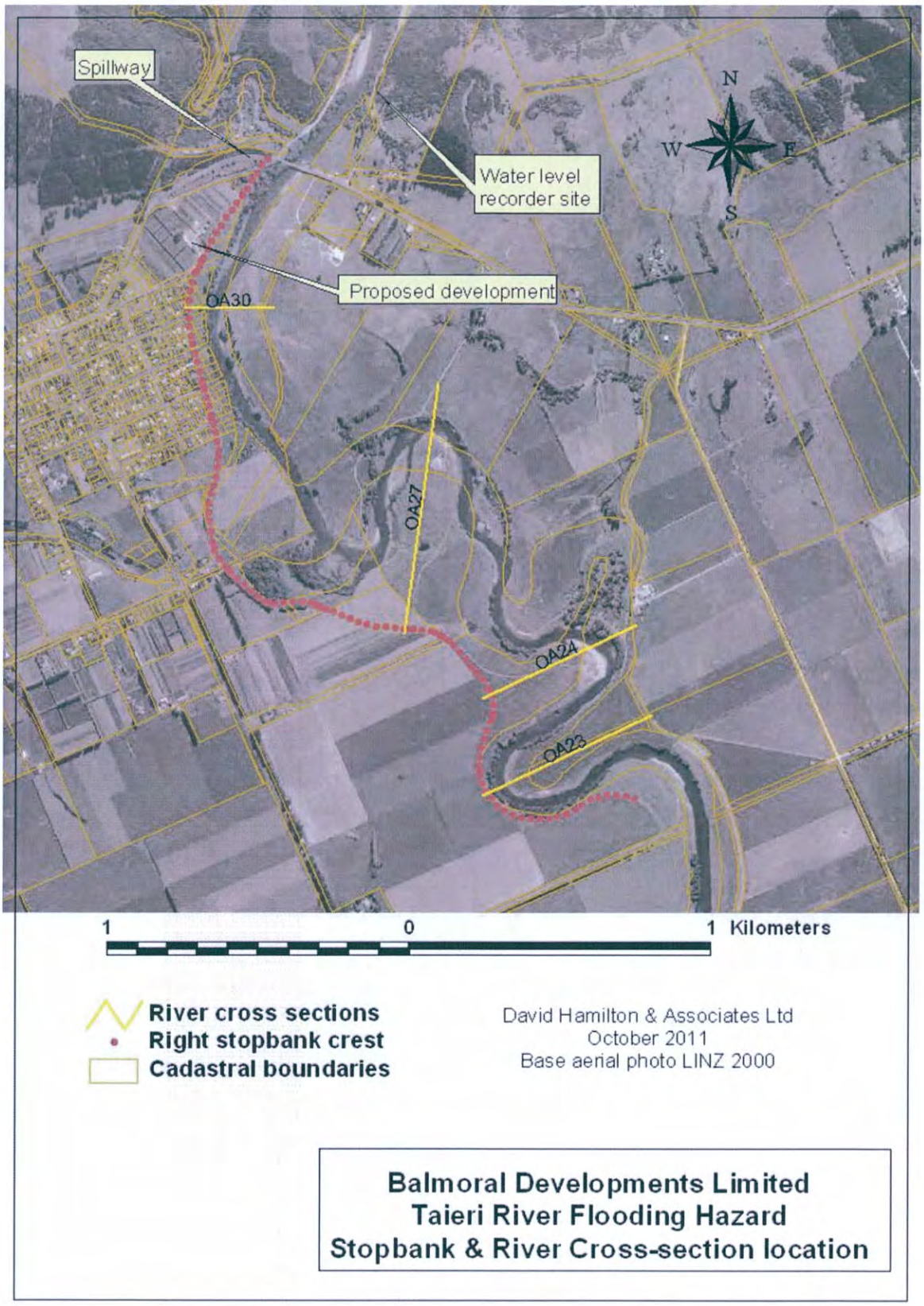
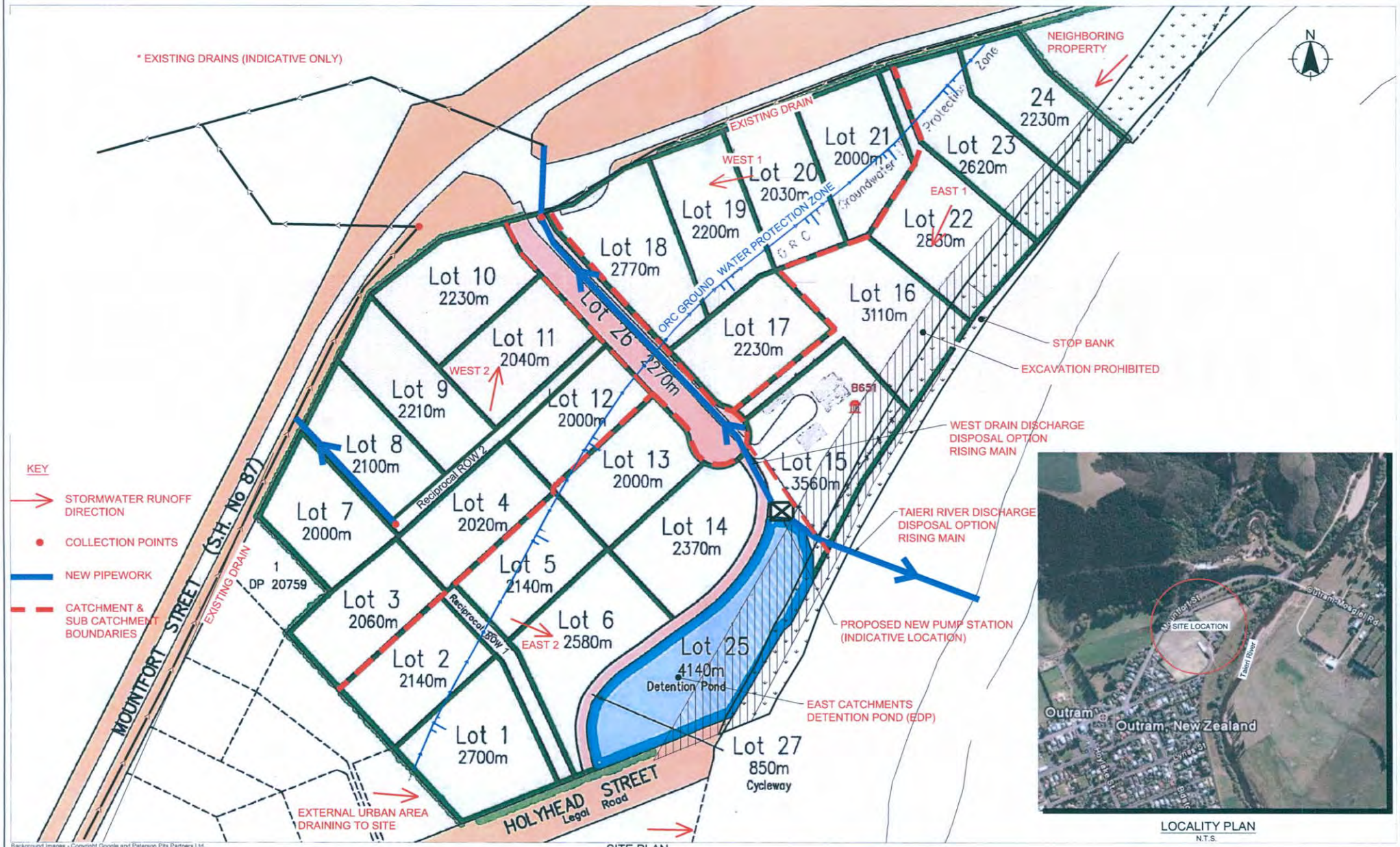



***Figure 3.4: Location of river cross sections, spillway and right stopbank***

| Flood Frequency Taieri River at Outram including historic floods | | | | | |
|---|---|---|---|---|---|
| | | | | Return Period T Yrs | |
| Year | Flood Flow m3/s | Rank | Weibull p | Weibull | Gringorten |
| 1980 | 2526 | 1 | 0.00690 | 145.00 | 257.36 |
| 1868 | 2200 | 2 | 0.01379 | 72.50 | 92.38 |
| 1957 | 2000 | 3 | 0.02069 | 48.33 | 56.30 |
| 1940 | 1800 | 4 | 0.02759 | 36.25 | 40.48 |
| 1923 | 1750 | 5 | 0.03448 | 29.00 | 31.61 |
| 1944 | 1750 | 6 | 0.04138 | 24.17 | 25.92 |
| 1877 | 1650 | 7 | 0.04828 | 20.71 | 21.97 |
| 1917 | 1600 | 8 | 0.05517 | 18.13 | 19.06 |
| 1993 | 1467 | 9 | 0.06207 | 16.11 | 16.84 |
| 1908 | 1400 | 10 | 0.06897 | 14.50 | 15.08 |
| 1945 | 1300 | 11 | 0.07586 | 13.18 | 13.65 |
| 1913 | 1250 | 12 | 0.08276 | 12.08 | 12.47 |
| 2010 | 1198 | 13 | 0.08966 | 11.15 | 11.47 |
| 1919 | 1150 | 14 | 0.09655 | 10.36 | 10.63 |
| 1978 | 1070 | 15 | 0.10345 | 9.67 | 9.90 |
| 2007 | 1067 | 16 | 0.11034 | 9.06 | 9.26 |
| 1994 | 1066 | 17 | 0.11724 | 8.53 | 8.70 |
| 1972 | 979 | 18 | 0.12414 | 8.06 | 8.21 |
| 1974 | 944 | 19 | 0.13103 | 7.63 | 7.77 |
| 1968 | 939 | 20 | 0.13793 | 7.25 | 7.37 |
| 1983 | 927 | 21 | 0.14483 | 6.90 | 7.01 |
| 1986 | 837 | 22 | 0.15172 | 6.59 | 6.68 |
| 2006 | 815 | 23 | 0.15862 | 6.30 | 6.39 |
| 1987 | 770 | 24 | 0.16552 | 6.04 | 6.12 |
| 1990 | 696 | 25 | 0.17241 | 5.80 | 5.87 |
| 1982 | 672 | 26 | 0.17931 | 5.58 | 5.64 |
| 2000 | 640 | 27 | 0.18621 | 5.37 | 5.43 |
| 1976 | 478 | 28 | 0.19310 | 5.18 | 5.23 |
| 1971 | 458 | 29 | 0.20000 | 5.00 | 5.05 |
| 2001 | 438 | 30 | 0.20690 | 4.83 | 4.88 |
| 1979 | 427 | 31 | 0.21379 | 4.68 | 4.72 |
| 1988 | 419 | 32 | 0.22069 | 4.53 | 4.57 |
| 2008 | 389 | 33 | 0.22759 | 4.39 | 4.43 |
| 2002 | 360 | 34 | 0.23448 | 4.26 | 4.29 |
| 2011 | 351 | 35 | 0.24138 | 4.14 | 4.17 |
| 1975 | 348 | 36 | 0.24828 | 4.03 | 4.05 |
| 1977 | 337 | 37 | 0.25517 | 3.92 | 3.94 |
| 1997 | 327 | 38 | 0.26207 | 3.82 | 3.84 |
| 1991 | 326 | 39 | 0.26897 | 3.72 | 3.74 |
| 2005 | 314 | 40 | 0.27586 | 3.63 | 3.64 |
| 1992 | 305 | 41 | 0.28276 | 3.54 | 3.55 |
| 1981 | 280 | 42 | 0.28966 | 3.45 | 3.47 |
| 1995 | 276 | 43 | 0.29655 | 3.37 | 3.39 |
| 1970 | 271 | 44 | 0.30345 | 3.30 | 3.31 |
| 2004 | 238 | 45 | 0.31034 | 3.22 | 3.23 |
| 2009 | 235 | 46 | 0.31724 | 3.15 | 3.16 |
| 1973 | 203 | 47 | 0.32414 | 3.09 | 3.10 |
| 1984 | 201 | 48 | 0.33103 | 3.02 | 3.03 |
| 1996 | 172 | 49 | 0.33793 | 2.96 | 2.97 |
| 1999 | 97 | 50 | 0.34483 | 2.90 | 2.91 |
| 1989 | 93 | 51 | 0.35172 | 2.84 | 2.85 |
| 1998 | 74 | 52 | 0.35862 | 2.79 | 2.80 |
| 1985 | 66 | 53 | 0.36552 | 2.74 | 2.74 |
| 2003 | 57 | 54 | 0.37241 | 2.69 | 2.69 |

***Table 3.2:***
***Taieri River at Outram Flood ranking including historic floods with plotting positions shown***




SITE PLAN
Scale: 1:750 (A1)

LOCALITY PLAN
N.T.S.

| Revision | App | Date |
|---|---|---|
| A - Taieri River Discharge Option Added | G. Dent | 12/11 |

| | | |
|---|---|---|
| Surveyed | - | - |
| Designed | G. DENT | 10/11 |
| Drawn | N. DEO | 10/11 |
| Reviewed | G. DENT | 10/11 |
| Approved | A. STEEL | 10/11 |



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Client: BALMORAL DEVELOPMENTS (OUTRAM) LTD

Project Title: BALMORAL SUBDIVISION PROPOSAL

Sheet Title: STORMWATER MANAGEMENT CONCEPT LAYOUT

Scale ( A1 Original ) 1:750

| Project No | Sheet | Revision |
|---|---|---|
| 704132 | SW-01 | A |

Figure 2.2

KTKO LTD
consultancy

21 November 2011

Johnston Whitney
P O Box 3
**MOSGIEL 9053**

Attn: Dave Johnston

## Balmoral Developments – Proposed Private Plan Change

**Proposal**
Te Rūnanga o Ōtākou understands that Balmoral Developments are seeking advice on Māori archaeological and cultural values for:

- Proposed Private Plan Change – Mountfort Street, Outram (as specified in the information provided)

**Situation**
Kāi Tahu ki Otago Ltd writes this report on behalf of Te Rūnanga o Ōtākou, two of the kaitiaki Rūnanga whose takiwa includes the site the proposal relates to.

**Decision**
It is considered that the proposal is not inconsistent with the Kāi Tahu ki Otago Natural Resource Management Plan 2005, (see appendices).

Rūnanga representatives have been informed the proposal received 4 November 2011.
Please be advised that Te Rūnanga o Ōtākou have no specific concerns with the above proposal, but do request the following be a conditions of the Private Plan Change:-

1. If koiwi (human skeletal remains), waahi taoka (resource or object of importance including greenstone/pounamu), waahi tapu (place or feature of special significance) or other artefact materials are discovered work shall stop, allowing for a site inspection by the appropriate Rūnaka and their advisors. These people will determine if the discovery is likely to be extensive and whether a thorough site investigation will be required. Materials discovered should be handled and removed by takata whenua who possess knowledge of tikanga (protocol) appropriate to their removal or preservation.

Te Rūnanga o Ōtākou would like it noted that although there are no recorded Māori archaeological sites within the boundaries of the proposed Private Plan Change, there is the potential to disturb unrecorded sites during any earthworks for the proposed subdivision. Therefore, any earthworks undertaken should be carried out in a way that allows contractors to monitor for artefacts or archaeological material.

This reply is specific to the above proposal. Any changes to the proposal will require further consultation.

Level 1, 258 Stuart Street, PO Box 446, Dunedin, New Zealand
Phone 03 477 0071 • Cell 027 424 6372 • Fax 03 477 0072
Email info@ktkoltd.co.nz

Kāi Tahu ki Otago Ltd request that the Council forward a copy of the recommending report, and if issued, a copy of the consent.

Nahaku noa
Na

**Chris Rosenbrock**
Manager

cc Te Rūnanga o Ōtākou

G:\KTKO\Resource Consents\2011 Resource Consents\(2937)Outram-Johnston Whitney(Balmoral Dvlpments)private plan change.docx

## Appendices

The following Issues/Objectives/Policies of the Kāi Tahu ki Otago Natural Resource Management Plan 2005 are seen as relevant to the above proposal. This relates to the holistic management of natural resources from the perspective of local iwi.

### Kāi Tahu ki Otago Natural Resource Management Plan 2005

#### Otago Region / Te Rohe o Otago

Wai Māori General Issues

Discharges

- Cumulative effects of discharges.
- Discharge of human waste and other contaminants from point and non point source discharges to water
- View that due to dilution rates, discharges to water have little or no effects.

Wai Māori General Objectives

- There is no discharge of human waste directly to water.
- Contaminants being discharged directly or indirectly to water are reduced.

Wai Māori General Policies

Discharges

- To require land disposal for human effluent and contaminants.
- To require consideration of alternatives and use of new technology for discharge renewal consents.
- To require monitoring of all discharges be undertaken on a regular basis and all information, including an independent analysis of monitoring results be made available to Kāi Tahu ki Otago.
- To encourage Management Plans for all discharge activities that details the procedure for containing spills and including plans for extraordinary events.
- To require all discharge systems be well maintained and regularly serviced. Copies of all service and maintenance records should be available to Kāi Tahu ki Otago upon request.

Wāhi Tapu General Issues

- Contamination of discharges and other activities seriously erodes the cultural value and integrity of wāhi tapu.

Wāhi Tahu Objectives

- All wāhi tapu are protected from inappropriate activities
- Kāi Tahu ki Otago have access to wāhi tapu.
- Wāhi tapu throughout the Otago region are protected in a culturally appropriate manner.

Wāhi Tapu General Policies

- To require consultation with Kāi Tahu ki Otago for activities that have the potential to affect wāhi tapu.

Discharges

- To discourage all discharges near wāhi tapu.

Cultural Landscapes General Issues

- Extension and maintenance of infrastructure (eg transport, telecommunications) can affect cultural landscapes.

Cultural Landscapes Objectives

- The protection of significant cultural landscapes from inappropriate use and development.

**Appendix D2**

New Zealand Historic Places Trust
Pouhere Taonga

**Our Ref: 12013-934**
**Your Ref:**

30 November 2011

Dave Johnston
Johnston Whitney
PO Box 3
Mosgiel

Dear Mr Johnston

**Re: Private Plan Change for Rezoning and Subdivision – Balmoral, Outram**

Thank you for getting in touch with NZHPT regarding the proposed rezoning and subdivision of the property associated with Balmoral in Outram.

As you are aware, Balmoral is a Category II registered historic place (ref. 3232) and is also scheduled in the DCC District Plan, with the entire external building envelope being protected. However, as you note in the Section 32 Evaluation and AEE provided to us, the location of the dwelling is incorrectly identified in the District Plan and it is proposed to remedy this as part of the proposed private plan change.

As discussed at our meeting last week, the NZHPT's main areas of interest in relation to the proposal to re-zone and subdivide the property relate to 1.) The impact of subdivision on the setting of the registered building and 2.) The potential for archaeological material to be discovered during any earthworks associated with the subdivision of the land.

With regard to the setting of the building, it is understood that the boundaries of the allotment on which the dwelling would sit correlate more or less to the boundary of the existing garden around the dwelling. It is understood that the garden is currently quite well defined. The house site would also encompass the two existing outbuildings. The NZHPT believes that this would be a reasonable area to maintain around the dwelling, particularly with the inclusion of the outbuildings. From the information we have on file about the property, it appears that at least one of the outbuildings (the former Cowman's cottage) has a long association with the house.

In terms of archaeology - as we discussed, it is possible that earthworks associated with the subdivision of the land could uncover remnants of 19th century buildings or structures associated with the occupation of the property and its use as a market garden. There are two ways of handling this potential issue –

1. Undertake or commission some additional research in order to ascertain whether any archaeological features or remains are present or likely to be present on the site, for example remains of any previous outbuildings. This approach has the benefit of providing more certainty in terms of whether any archaeological material is likely to be present, and whether or not an archaeological authority

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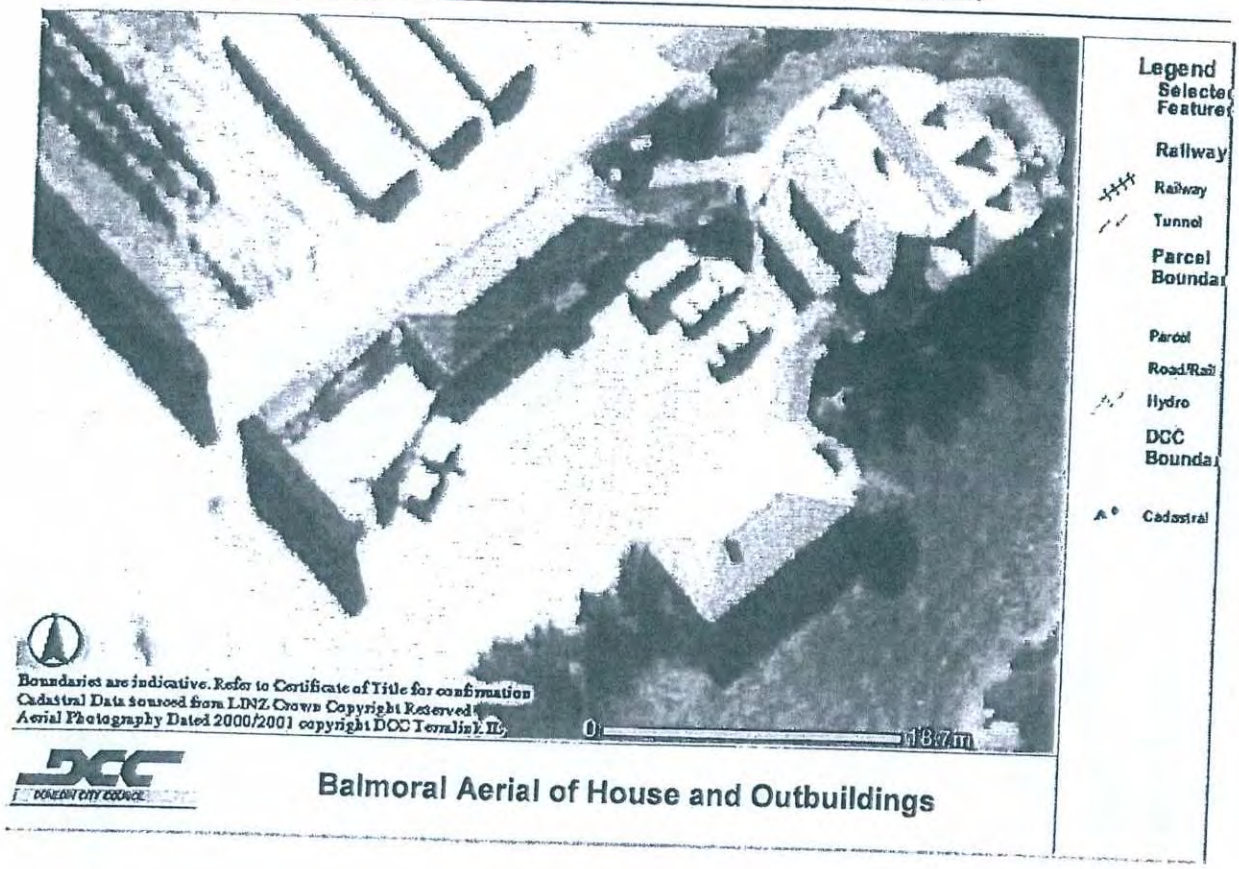
needs to be obtained from NZHPT. If obtained in advance, even if only as a precautionary measure, an archaeological authority would prevent delays to the project if any material were to be discovered during works.

2. Go ahead with the work without obtaining an authority but under an accidental discovery protocol as suggested in the report. This would mean that works would need to stop and an archaeological authority obtained if any archaeological material was uncovered during the works.

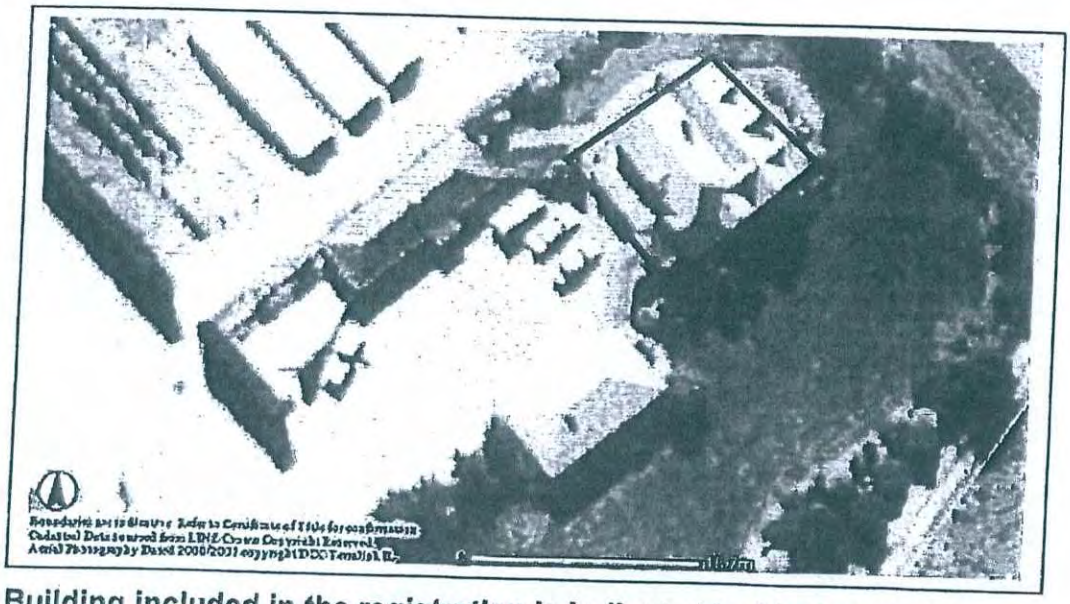
I hope the above information is of assistance. If you have any queries please don't hesitate to contact me.

Yours sincerely

Jane O'Dea
Heritage Advisor (Planning) (Otago/Southland)




**Balmoral Aerial of House and Outbuildings**



**Building included in the registration is indicated by black rectangle.**