

Our Ref: 10-473 GC:JM

30 June 2011

Stockland Development Pty Ltd
Level 4, 99 Melbourne Street,
South Brisbane QLD 4101

Attn: Mr: Michael McErlean

Dear Sir,

Directors

Brian Lees

DipCE MIEAust CPEng RPEQ NPER

Jason Murdoch

BEng (Civil) MIEAust RPEQ

Brett Dellit

BEng (Civil Hons.) MIEAust RPEQ

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 23 / 12 / 11

**PARADISE WATERS – PRECINCT 7
SEWERAGE PHASING AND WATER PROPOSAL**

Further to your recent request we provide the following advice of our understanding of the external infrastructure required to construct the first 150 allotments of the above development.

The major constraint to this development and other future urban land parcels within the catchment being developed is the provision of sewerage and water infrastructure. It would appear that none of the land owners have the ability to fund the infrastructure individually or as a consortium.

SEWERAGE

We were provided, by Ipswich City Council (ICC) an alignment that was agreed between Council Officers, Queensland Urban Utilities (QUU) and the Department of Environment Resource Management. We have walked this alignment with Ipswich City Council's representatives, the team's Ecologist and a surveyor. A new alignment was determined in the field and this alignment is depicted on the attached design drawings 10-476 01 to 08.

We have undertaken a review of the impacts of the increased density of Paradise Waters on the previously developed schematics to allow resizing of the trunk main if required. During this process we also removed the sections of land that are no longer developable. For example the Main Roads Corridor and Culturally excluded lands. The above is summarised in a Sewerage Capacity Report entitled "Paradise Waters – External Sewerage Deebling Creek Trunk Sewerage Analysis". This report recommends no change to current pipe sizing.

The detail design will then need to be completed, this will include Ecological, Geotechnical, Cultural and Soil Dispersiveness investigations. The detail design will further assess odour and timing issues of the sewerage release as uncontrolled flows would be below scour velocities.

In addition, after review of the approval/construction timeframes, it is likely that the first dwelling would be occupied before the external sewerage construction is finalised. At this stage we would anticipate the first dwelling to be occupied in the first half of 2012.

Given the Ecological, Geotechnical, Cultural and Soil Dispersiveness issues it is our expectation that the approval process for the external sewerage may take up to nine (9) months and that construction should be possible in three (3) months. We have allowed 18 months in the programme to be conservative.

As the design is progressing well the approval timeframe may be achieved in early as three months.

We spoke with Mr Brett Curruthers of Queensland Urban Utilities (QUU) in the last week update him on the progress on our work.

Opus (Consulting Engineers) have been provided our information to allow them to accommodate our tie in.

On the basis of the above our Phasing is as follows;

Phase	Months			
	0 to 6	6 to 12	12 to 18	18 to 24
1. Initial 150 dwellings Occupied (Timeframe 24 months)				
2. Detailed design and Approval secured for gravity sewerage (Timeframe 12 months)				
3. Construction of gravity sewerage (Timeframe 3 to 6 months)				
4. Gravity sewerage Commissioned				

Phase 1 – Initial 150 Dwellings Occupied (Timeframe 24 months)

It is our proposal to construct a tankering station on the site, this storage would need to meet DERM requirements for spillage, alarms, Emergency Notifications, etc.

We have reviewed a budget based on Average Dry Weather Flow for the 24 months (table below) the total budget is \$820,000 (Excl. GST).

It should be noted that at the Freshwater development for Stockland Development Pty Ltd (which is located at Brays Road, Griffin) we undertook a tankering programme which on review averaged 230 l/dwelling (ET) per day. This result was significant in terms of cost savings and provided a real case study of affordable dwelling outputs in a time of Level 4/5 water restrictions.

Months	Houses Delivered	Houses Accum.	Based on ADWF Accum. Cost x 1.1 (\$)	Actual Cost based on Freshwater Experience (say 300 l/ET/day) Accum. Cost
START	Civil Works Commences			
1				
2				
3				
4				
5				
6	Land delivered			
7				
8				
9	10	10	\$ 6,011.28	\$ 1,728.00
10	10	20	\$ 18,033.84	\$ 5,184.00
11	10	30	\$ 36,067.68	\$ 10,368.00
12	10	40	\$ 60,112.80	\$ 17,280.00
13	10	50	\$ 90,169.20	\$ 25,920.00
14	10	60	\$ 126,236.88	\$ 36,288.00
15	10	70	\$ 168,315.84	\$ 48,384.00
16	10	80	\$ 216,406.08	\$ 62,208.00
17	10	90	\$ 270,507.60	\$ 77,760.00
18	10	100	\$ 330,620.40	\$ 95,040.00
19	10	110	\$ 396,744.48	\$ 114,048.00
20	10	120	\$ 468,879.84	\$ 134,784.00
21	10	130	\$ 547,026.48	\$ 157,248.00
22	10	140	\$ 631,184.40	\$ 181,440.00
23	10	150	\$ 721,353.60	\$ 207,360.00
24	10	160	\$ 817,534.08	\$ 235,008.00

Phase 2. Detailed design and Approval secured for gravity sewerage (Timeframe 12 months)

The detailed design is progressing and in the next few weeks detailed investigations for Ecological and Geotechnical information will be carried out. Stockland are engaging with the Cultural Heritage representatives directly in regards to the alignment.

Phase 3. Construction of gravity sewerage (Timeframe 3 to 6 months)

From our experience with construction of this size infrastructure, we propose to engage with a contractor who is adequately resourced to provide multiple construction crews and tunnel boring equipment.

The construction of the main will need to contend with: Dispersive Soils, Rock, Vegetation, Fauna, Cultural Heritage, Water Quality and Third Party Landowner issues.

Phase 4. Gravity sewerage Commissioned

It is proposed that the gravity sewerage main would not be commissioned until the 150th dwelling was occupied. It is also expected that once construction of the external sewerage main is commenced the smaller developers in the catchment will be able to proceed with their developments.

At the time of commissioning of the trunk sewer, if the flows are not sufficient to meet the scour velocity and minimum detention times, it may be necessary to further utilise the tankering storage facility. This process would involve controlled releases from the storage facility with some chemical treatment and water injection to ensure that the sewage can travel into the system at its optimum condition.

This is to be detailed as part of the detailed design.

WATER

Attached is a report from Worley Parsons, which proposes a solution to service the first 150 allotments from the existing infrastructure.

This strategy relies on the reservoir pumps providing support in case of a fire fighting situation. We will further investigate with QUU the existing electrical supply and determine if a generator is required.

The report also identifies that a single 5 megalitre reservoir is required to service the Rilepley High Level Zone for the design horizon. Attached is SK3341 which depicts a concept reservoir for the site.

The detailed design of the reservoir and possible pump station upgrades will be tendered shortly. Such that the reservoir can be commissioned prior to the trigger point of 180 lots and shopping centre in occupied.

In addition we have updated Mr Brett Curruthers of QUU in the last week in this regard.

Should you require any further information please do not hesitate to contact the undersigned.

Yours Faithfully
BRADLEES CONSULTING


Jason Murdoch
Director
RPEQ 6336

Encl.