

The alternative locations considered are presented in Table 3-4. Based on the criteria above Volwaterbaai (previously called Sunset Cruise) was selected as the most favourable site by the project team.

**Table 3-4: Alternative Locations for Seawater Intake**

| No. | Description (see Figure 3-4)   | Status        | Considerations/Motivation  |
|-----|--|---------------|--|
| SI1 | <b>Island Point:</b> a rocky headland extending approximately 300m into the sea. Three channels transect the headland, all of which were considered for suitability. | Eliminated    | <ul style="list-style-type: none"> <li>• Would require the least modification.</li> <li>• Most favourable natural intake site.</li> <li>• Installation of intake pipes presents a construction and operational risk.</li> <li>• Located outside Farm Strandfontein 559 farm boundary (weighing heavily against this site).</li> <li>• A seal colony occupies this site.</li> <li>• Expected to face the strongest objection from the public.</li> </ul>  |
| SI2 | <b>Volwaterbaai:</b> shallow narrow gully protected by a high rock bench   | Assess in EIA | <ul style="list-style-type: none"> <li>• No foreseeable fatal flaws or risks.</li> <li>• Would require significant modification, but less complex and lower risk work in a defined area that is partially dry and can be accessed from the shore.</li> <li>• Protected from prevailing swell facilitating excavation and blasting.</li> <li>• Existing channel requires reduced amount of blasting and excavation for intake channel.</li> <li>• Gully would provide reliable supply of seawater of acceptable quality.</li> <li>• More favourably located than Island Point (i.e. on Farm Strandfontein 559).</li> <li>• Likely to have lowest environmental impact during construction and operation.</li> </ul> |
| SI3 | <b>50S:</b> Gully/embayment in rock  | Eliminated    | <ul style="list-style-type: none"> <li>• Would require substantial modification.</li> <li>• Would require a berm to limit surge with no certainty of success.</li> <li>• Presence of sand is considered a fatal flaw from an engineering perspective.</li> </ul>   |
| SI4 | <b>6PS:</b> Long narrow gully in high rock   | Eliminated    | <ul style="list-style-type: none"> <li>• Would require substantial modification.</li> <li>• Would require a berm and deepening of the gully with no certainty of success.</li> </ul>   |

### 3.5.2.3 Alternative Locations for Brine Discharge

Potential brine discharge points were identified near each of the seawater intake sites, with the exception of Island Point, which was eliminated early during investigations. Three potential brine discharge sites were identified at intake site 50S and two potential sites at intake site 6PS. These were however eliminated from further consideration once the respective intake sites were screened out.

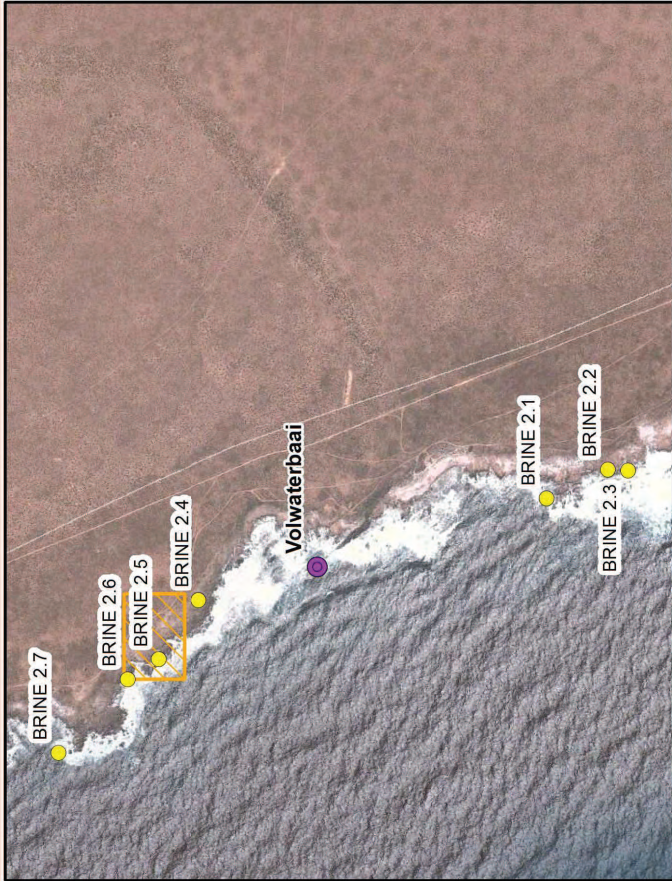
Seven potential discharge sites were identified at Volwaterbaai, of which Brine 2.5 was selected as most suitable based on engineering considerations. Discharge at this site was further refined to identify two locations: **Brine 5** and **Brine Rock**, which were further evaluated in consultation with the marine ecologists, and, separately, with representatives of the DEA: O&C at an initial meeting held on 7 March 2013 (minutes attached as Appendix 3A).

The potential locations for brine discharge at each of the intake sites and the more specific locations identified at Brine 2.5 are presented in Figure 3-5.



**Legend**

- Volwaterbaai
- 50S
- 6PS
- Brine Discharge



0 75150 300 Meters

|                        |           |
|------------------------|-----------|
| Data Source:           |           |
| Bing Maps (2013)       |           |
| Scale:                 |           |
| 1:20 000               | @ A4      |
| Projection:            |           |
| TM                     | HH94      |
| Central Meridian/Zone: |           |
| Lo17                   |           |
| Date:                  |           |
| 19.03.2013             | GILB/FUBM |
| Project No:            |           |
| 451101                 | 3-5       |
| Compiled by:           |           |

**VOLWATERBAAI DESALINATION PLANT AND ASSOCIATED INFRASTRUCTURE, NORTHERN CAPE  
ALTERNATIVE LOCATIONS FOR BRINE DISCHARGE**

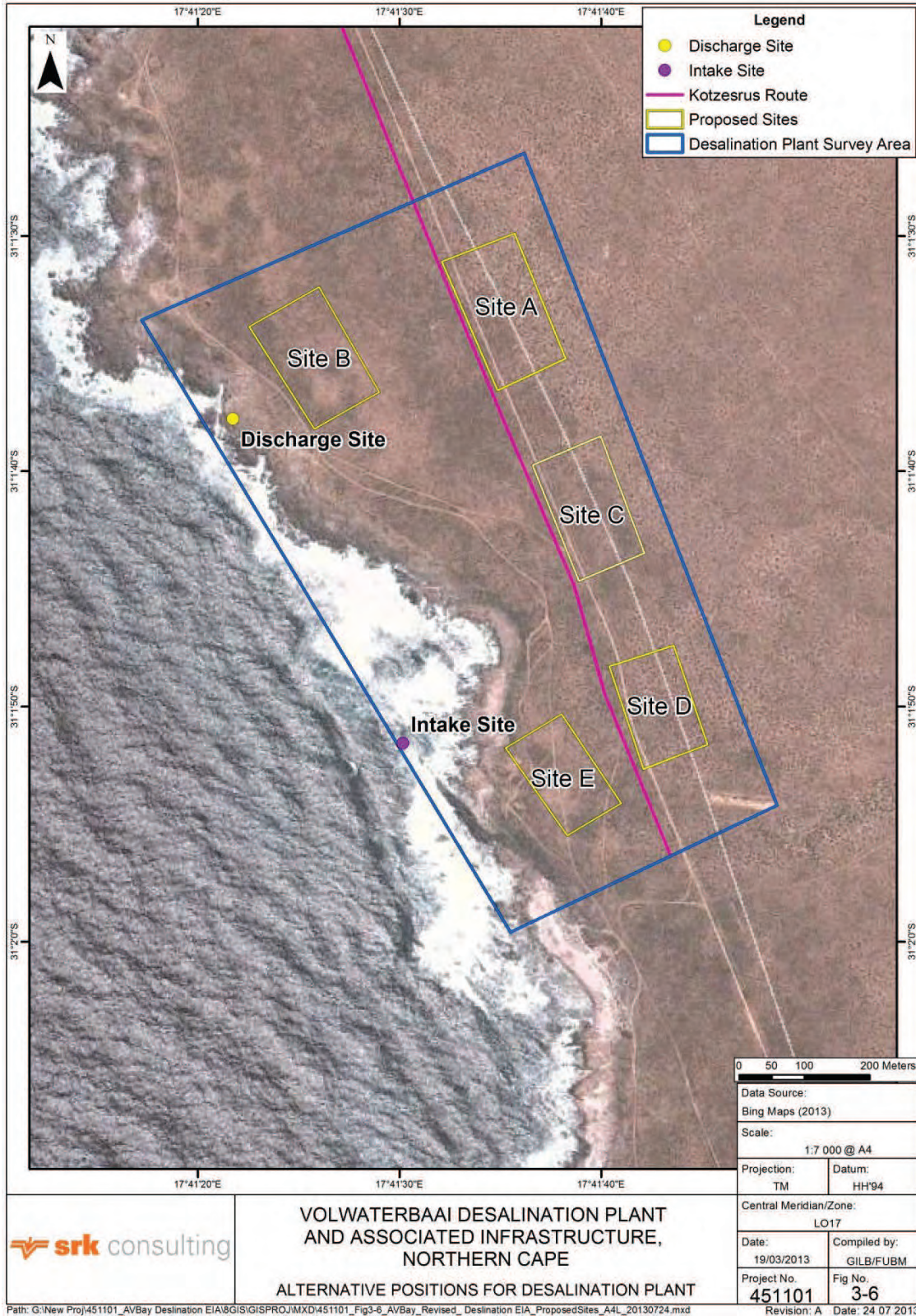


**Table 3-5: Alternatives Locations for Brine Discharge**

| No.  | Description (see Figure 3-5)  | Status                                 | Considerations/Motivation  |
|------|---|--|--|
| BD1  | <b>Brine 2.1</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Considerable disturbance of beach and intertidal reef required for construction.</li> <li>• Limited wave energy and currents for brine dispersion.</li> </ul>   |
| BD2  | <b>Brine 2.2</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Considerable disturbance of beach and intertidal reef required for construction.</li> <li>• Limited wave energy and currents for brine dispersion.</li> </ul>   |
| BD3  | <b>Brine 2.3</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Considerable disturbance of beach and intertidal reef required for construction.</li> <li>• Limited wave energy and currents for brine dispersion.</li> </ul>   |
| BD4  | <b>Brine 2.4</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Engineering challenges.</li> </ul>  |
| BD5  | <b>Brine 2.5</b> at Volwaterbaai  | Preferred location:<br>further refined | <ul style="list-style-type: none"> <li>• High wave and current energy close to shore facilitates rapid mixing and dispersion.</li> <li>• Far enough from intake to avoid re-circulation.</li> <li>• Relatively close to desalination plant.</li> <li>• Reasonable access for construction plant with limited modifications or construction activity required below low-water line.</li> </ul>  |
| BD5a | <b>Brine 5</b> at Brine 2.5: discharge within an existing gully, close to the sea end of the gully. Pipe would be buried/covered on land and in gully | Assess in EIA                          | <ul style="list-style-type: none"> <li>• Limited marine impacts.</li> <li>• Brine will be discharged below the Lowest Astronomical Tide (LAT).</li> <li>• Dilution requirements achievable for relatively low flow rates using surf zone discharge along energetic coastline provided no reef trap brine and allow accumulation.</li> <li>• Preferred from a visual perspective.</li> <li>• Easier access for construction plant.</li> </ul>   |
| BD5b | <b>Brine Rock</b> at Brine 2.5: discharge pipe would follow natural trench over rocky area.   | Eliminated                             | <ul style="list-style-type: none"> <li>• High (compared to Brine 5) marine impact.</li> <li>• Discharge above the Highest Astronomical Tide (HAT) which is not recommended by DEA:O&amp;C.</li> <li>• Likely that brine would pool in high and mid-shore crevices.</li> <li>• Dilution would only occur at high tides and during storms.</li> <li>• Evaporation may lead to salt crystals forming on rocks.</li> <li>• Least preferred from a visual perspective.</li> <li>• More difficult access for construction plant and anticipated greater construction impacts.</li> </ul> |
| BD6  | <b>Brine 2.6</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Could be suitable as conditions are similar to Brine 2.5, but less favourable as some removal of hard rock (blasting) required.</li> </ul>  |
| BD7  | <b>Brine 2.7</b> at Volwaterbaai  | Eliminated                             | <ul style="list-style-type: none"> <li>• Pipe route would require extensive excavation and blasting of hard rock.</li> <li>• Distance from desalination plant could be prohibitively long.</li> <li>• Seal colony present at the site.</li> </ul>  |
| BD8  | <b>Brine 3.1:</b> at Intake Site 50S  | Eliminated                             | <ul style="list-style-type: none"> <li>• Intake Site 50S eliminated.</li> </ul>  |
| BD9  | <b>Brine 3.2:</b> at Intake Site 50S  | Eliminated                             | <ul style="list-style-type: none"> <li>• Intake Site 50S eliminated.</li> </ul>  |
| BD10 | <b>Brine 3.3:</b> at Intake Site 50S  | Eliminated                             | <ul style="list-style-type: none"> <li>• Intake Site 50S eliminated.</li> </ul>  |
| BD11 | <b>Brine 4.1:</b> at Intake Site 6PS  | Eliminated                             | <ul style="list-style-type: none"> <li>• Intake Site 50S eliminated.</li> </ul>  |
| BD12 | <b>Brine 4.2:</b> at Intake Site 6PS  | Eliminated                             | <ul style="list-style-type: none"> <li>• Intake Site 50S eliminated.</li> </ul>  |

**3.5.2.4 Alternative Positions for Desalination Plant**

Following the selection of the preferred seawater intake site at Volwaterbaai, five alternative positions for the desalination plant were identified (see Figure 3-6). The exact position of the desalination plant at the Volwaterbaai location has not yet been determined but will be decided during the Impact Assessment Phase.



**Figure 3-6: Alternative Positions for Desalination Plant**

Factors influencing the selection of the preferred position include elevation (the ability to pump intake water to the elevation), distance (the ability to pump intake water over distance), preference for gravitational discharge of water/brine (rather than pumping), visual and aesthetic considerations, and geotechnical considerations.

**Table 3-6: Alternative Locations for Desalination Plant**

| No. | Description (see Figure 3-6)  | Status                                      | Considerations/Motivation  |
|-----|---|---|--|
| DP1 | <b>Site A:</b> close to discharge point, east of existing road            | Assess in EIA                               | <ul style="list-style-type: none"> <li>Land is level and thus requires limited earthworks for plant and reservoir.</li> <li>Position allows for brine to gravitate to the sea.</li> <li>Will require additional intermediate booster pump station to deliver the intake seawater.</li> <li>Long seawater pipelines, requiring long trenches if pipes are below ground.</li> <li>Will require larger infrastructure at intake site to house electrical and chlorination equipment.</li> </ul>   |
| DP2 | <b>Site B:</b> close to discharge point, west of existing road            | Assess in EIA                               | <ul style="list-style-type: none"> <li>Land is level and thus requires limited earthworks.</li> <li>Position allows for brine to gravitate to the sea.</li> <li>Will require additional intermediate booster pump station to deliver the intake seawater.</li> <li>Long seawater pipelines, requiring long trenches if pipes are below ground.</li> <li>Will require larger infrastructure at intake site to house electrical and chlorination equipment.</li> </ul>   |
| DP3 | <b>Site C:</b> between intake and discharge points, east of existing road | Assess in EIA                               | <ul style="list-style-type: none"> <li>Land is reasonably level and thus requires limited earthworks.</li> <li>Position allows for brine to gravitate to the sea.</li> <li>Will require additional intermediate booster pump station to deliver the intake seawater.</li> <li>Will require larger infrastructure at intake site to house electrical and chlorination equipment.</li> </ul>   |
| DP4 | <b>Site D:</b> at intake point, east of existing road                     | Assess in EIA:<br><b>Preferred location</b> | <ul style="list-style-type: none"> <li>Land is reasonably level and thus requires limited earthworks.</li> <li>May require additional pump for brine discharge.</li> <li>Product water can gravitate to the reservoir (assuming reservoir positioned to the west, alternatively reservoir could be placed to south).</li> <li>Additional booster pump station not required for intake water delivery. Intake pumps are sufficient.</li> <li>May not require larger infrastructure at intake site to house electrical and chlorination equipment (can possibly be housed at desalination plant).</li> </ul> |
| DP5 | <b>Site E:</b> at intake point west of existing road                      | Assess in EIA                               | <ul style="list-style-type: none"> <li>Considerable earthworks required to level site.</li> <li>Will require additional pumps for brine discharge.</li> <li>Product will need to be pumped to the reservoir.</li> <li>No additional electrical and chlorination infrastructure will be required at the intake site (can be housed at desalination plant).</li> </ul>   |