SYNOPSIS This management plan establishes responsibilities and procedures for the management of drainage maintenance during Stage 1 of the development of the Kings Forest Development, New South Wales.
SUMMARY

Project 28 Pty Ltd commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Drainage Maintenance Management Plan (DMMP) for the Kings Forest Stage 1 Project Application. This DMMP considers the findings of investigations conducted by G&S which are incorporated in the Kings Forest Stage 1 Project Application Drainage Maintenance Impact Assessment (June 2011) produced for Project 28 Pty Ltd by G&S (the “DMIA report”).

The DMIA report identifies several potential impacts associated with drainage maintenance works including; hydrological impacts, the disturbance of acid sulfate soils, water quality impacts, erosion and sedimentation and impacts to flora and fauna, triggering the need for a DMMP.

It is estimated that the east-west drain will only require maintenance once every ten years. This DMMP is designed to ensure that all drainage maintenance conducted at the Kings Forest development site is conducted in accordance with proven management techniques. The DMMP provides a clear management protocol based on operational policies, performance criteria, implementation strategies and corrective actions, should they be necessary. The DMMP identifies who is responsible for each specific aspect of drainage maintenance management.

The DMMP provides a working tabular format with provision for amendment if required.
CONTENTS

1 Introduction ................................................................. 5
   1.1 Background .......................................................... 5
   1.2 The project application ............................................. 5
   1.3 Objectives ............................................................. 5

2 Site drainage ................................................................. 6
   2.1 Drainage maintenance .............................................. 6

3 DMMP structure ........................................................... 7
   3.1 General commitments .............................................. 8
   3.2 Definitions ......................................................... 8

4 Management of potential impacts – Maintenance phase ........................................ 9
   4.1 Mechanical drainage maintenance ............................... 10
   4.2 Acid sulfate soil treatment ....................................... 11
   4.3 Sediment and erosion control .................................... 13
   4.4 Surface water quality management ............................. 14
   4.5 Herbicide application ............................................. 16

5 Administration of the DMMP ............................................ 17
   5.1 Amendment of the DMMP ......................................... 17
   5.2 Incident management ............................................. 17
1 Introduction

1.1 Background

Project 28 Pty Ltd commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Drainage Maintenance Management Plan (DMMP) for the Stage 1 Project Application for the proposed Kings Forest development at Kings Forest, New South Wales.

The Director General of the Department of Planning issued amended Environmental Assessment Requirements (DGRs) for the project application on 23 December 2010. The DGRs require that specialist advice be provided to address the following Key Issue:

Key Issue 7.6: Assess the necessity of drains currently in operation across the site and, for those required into the future, assess the impact of any ongoing maintenance required to ensure their effectiveness.

The DMIA report identifies several potential impacts associated with drainage maintenance works including; hydrological impacts, the disturbance of acid sulfate soils, water quality impacts, erosion and sedimentation and impacts to flora and fauna.

The identification of these issues necessitates the production of a DMMP.

1.2 The project application

The Kings Forest Development site covers approximately 870 hectares and is situated south-west of the town of Cudgen. The Kings Forest development will require excavation works. Proposed lake excavations will be to a depth of greater than 4.5m below Natural Surface Level (NSL), whilst the majority of other required excavation at the site will be less than 2m below NSL. The Kings Forest Stage 1 Project Application proposes cut and fill earthworks across the site involving a total volume of approximately 1,000,000m³ of material, with the majority of excavated materials to be used as structural fill.

The Project Application incorporates the following elements:

- Subdivision to create new lots for future development.
- Construction of the entrance road to the site and associated intersection works on Tweed Coast Road.
- Subdivision and associated infrastructure works for the first stage of urban development (Precinct 5).
- Bulk earthworks across the site.
- A commercial site to the north of the Tweed Coast Road.

1.3 Objectives

This report constitutes a DMMP for the Stage 1 Project Application for the Kings Forest development. The aim of this report is to detail strategies to mitigate the potential environmental impacts associated with the ongoing maintenance of the east-west drain at the Kings Forest site in terms of:

- hydrological impacts
- disturbance of acid sulfate soils
- surface water quality impacts
- erosion and sedimentation
- impacts to flora and fauna.
2 Site drainage

Drainage at Kings Forest has been studied by several previous investigations. The site drainage network was the subject of a report by Phillip Bell & Partners (Kings Forest Stormwater Management Plan, 2001). The drainage system ranges from natural, largely unmodified waterways to minor overland flow paths.

The site is located within the Cudgen Creek catchment and is predominantly drained in an easterly direction by Blacks Creek (the 'east-west drain'). Runoff from the site also enters Cudgen Creek under Old Bogangar Road to the north of the site and via the lowlands adjacent to the southern site boundary.

Drainage from the north-eastern portion of the site flows into a State Environmental Planning Policy No. 14 (SEPP14) wetland area prior to discharging from the Kings Forest site. There is no statutory definition that can be applied for the classification of a SEPP 14 wetland. Determination of SEPP 14 wetlands was undertaken as a mapping exercise, based upon a set of ‘botanical indicators, which were deemed,

for the purposes of the survey, to characterise wetlands’ (Adam et al., 1985, p. 28).

2.1 Drainage maintenance

The flood modelling conducted for the site has assumed that only the major east-west drain is maintained. All other drains are modelled as not maintained. The resolution of the model is such that the drainage function of the minor drains has been disregarded by the model, so the maintenance of these drains is not required to achieve the level of flood immunity predicted for the developed site.

The main east-west drain will need to be maintained to provide adequate drainage for the site and to ensure appropriate flood conveyance. The likely frequency of disturbance would be low (approximately once every ten years) however, necessary maintenance works could potentially result in hydrological impacts, the disturbance of acid sulfate soils, water quality impacts, erosion and sedimentation, impacts to flora and fauna.

The following sections detail the management measures for the management of potential impacts associated with drainage maintenance works.
## 3 DMMP structure

This DMMP acknowledges the potential environmental impacts associated with the ongoing drainage maintenance required at the Kings Forest site, and details strategies to mitigate them.

Each control strategy is based upon proven environmental management methods and is presented as a commitment. The commitments made within this document will form the basis of future assessments, which will be made available to the Tweed Shire Council (TSC) for review.

The DMMP is based on a series of tables for use during drainage maintenance. The person responsible for the implementation of the measures detailed is written on the table itself. The tables then detail the issue, the performance criteria, the implementation strategy, monitoring, auditing, reporting, failure identification and the corrective action. The detachable pages within each section detail the provisions of the DMMP. The format is presented below for reference purposes.

### #.# Title

<table>
<thead>
<tr>
<th>Person responsible</th>
<th>This is the person who has accepted the responsibility of implementing the DMMP provisions detailed on this page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue</td>
<td>The issue with which the table deals.</td>
</tr>
<tr>
<td>Operational policy</td>
<td>The operational policy or management objective that applies to the element.</td>
</tr>
<tr>
<td>Performance criteria</td>
<td>Performance criteria (outcomes) for each element of the operation.</td>
</tr>
<tr>
<td>Implementation strategy</td>
<td>The strategies or tasks (to nominated operational design standards) that will be implemented to achieve the performance criteria.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>The monitoring requirements which will measure actual performance (i.e. specified limits to pre-selected indicators of change).</td>
</tr>
<tr>
<td>Auditing</td>
<td>The auditing requirements, which will verify implementation of, agreed construction and operation phase environmental management strategies and compliance with agreed performance criteria.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Content, timing and responsibility for reporting and auditing of monitoring results.</td>
</tr>
<tr>
<td>Identification of incident or failure</td>
<td>The circumstances under which the agreed performance criteria are unlikely to be met and the risk of environmental harm increases dramatically.</td>
</tr>
<tr>
<td>Corrective action</td>
<td>The action to be implemented in case a performance requirement is not reached and the person(s) / company(s) responsible for action.</td>
</tr>
</tbody>
</table>
Commitment #

What the management has committed the company to.

An objective of the tabular format is to allow for change and allow the DMMP to be a working document. If items need altering, changes may be made to the individual tables after appropriate consultation with the statutory authorities.

3.1 General commitments

Commitment 1

The Developer undertakes to comply with the environmental implementation strategy as contained within the approved Drainage Maintenance Management Plan (DMMP).

Commitment 2

The Developer undertakes to fulfil all commitments made in this DMMP and to carry out its activities on the project site in accordance with relevant current statutory requirements and approved amendments.

3.2 Definitions

In this DMMP the terms have the following meanings:

- ASS means Acid Sulfate Soils. This is the collective term for both Actual Acid Sulfate Soils and Potential Acid Sulfate Soils.

- Cleaning/Maintenance means the routine cleaning of vegetation and sediment in drains at the site for the purposes of maintaining site drainage.

- Developer means the party undertaking the development of the land and includes the person nominated as having the responsibility for implementing the provisions of the DMMP.

- Development means the development of the site as defined in this Project Application and future project applications.

- DECCW means the NSW Department of Environment, Climate Change and Water.

- DMMP means the approved Drainage Maintenance Management Plan and includes any amendments that may be approved from time to time.


- Sediment means unconsolidated, fine-grained material (typically derived from the weathering of rocks), that is transported by water and settles on the floor of seas, rivers streams and other bodies of water.

- Silt means sediment having particles finer than sand and coarser than clay (i.e. 2 to 63µm).

- Suspended solids means the concentration of filterable particles in water (retained on a 1.2µm filter) and reported by volume (mg/L).

- TSC means the Tweed Shire Council.

- Turbidity means a measure of the cloudiness of water, which is determined by the amount of light scattered by suspended particles.
4 Management of potential impacts – Maintenance phase

The DMMP requires the Developer to mitigate the potential environmental impacts associated with the maintenance of the east-west drainage channel.

During drain maintenance activities, a visual inspection of water quality within the drain is to be conducted to ensure waters are not excessively turbid or discoloured and that no degradation to flora or fauna has occurred.
### 4.1 Mechanical drainage maintenance

<table>
<thead>
<tr>
<th>Person responsible</th>
<th>Contractor’s Site Manager, Environmental Consultant</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Issue</th>
<th>Mechanical maintenance and control of sedimentation and vegetation in drains.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational policy</td>
<td>To minimise soil disturbance during the mechanical removal of sediment and vegetation from drains.</td>
</tr>
<tr>
<td>Performance criteria</td>
<td>Drain maintenance operations should aim to minimise physical drain disturbance during sediment and vegetation removal.</td>
</tr>
</tbody>
</table>

| Implementation strategy | • To control sediment and acid generation, drain maintenance operations should not be conducted during runoff events.  
• Drain maintenance should not enlarge or alter the original drain profile.  
• Drain maintenance operations should aim to maintain drain stability by minimising disturbance to vegetation root stock.  
• The clearing of drains within 40m of a designated waterway should not be undertaken without prior approval from the Department of Land and Water Conservation (DLWC).  
• Approval from the NSW Department of Primary Industries (DPI) should be sought prior to the commencement of any drain cleaning activities. |
|------------------------|--------------------------------------------------------------------------------|
| Monitoring | • Carry out visual inspections during drain cleaning to ensure there has been minimal disturbance to the drain profile.  
• Visually inspect bank stability and vegetation root stock to ensure it is not excessively disturbed by drain cleaning operations. |
| Auditing | • Visual inspections are to be carried out after rainfall events to verify that runoff has not degraded the profile and stability of recently cleaned drains. |
| Reporting | • The drain maintenance records shall be retained on site for inspection by local and state authorities.  
• Records of issues such as weed regrowth, sedimentation, flooding, water quality and aquatic species mortality within drains shall be maintained on site.  
• Any fish kills at the site should be recorded. |
| Identification of incident or failure | • Degradation of drain stability.  
• Excessive removal of vegetation root stock.  
• Degradation of surface water quality.  
• A recorded fish kill. |
| Corrective action | Identify the reason for stability failure and amend the drain cleaning procedures and/or decrease maintenance intensity as necessary. |

**Commitment 3**

The Developer will appropriately implement drainage maintenance works to minimise physical drain disturbance during vegetation removal.
### 4.2 Acid sulfate soil treatment

<table>
<thead>
<tr>
<th><strong>Person responsible</strong></th>
<th>Contractor’s Site Manager, Environmental Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue</strong></td>
<td>Assessment and treatment of acid sulfate soils identified onsite.</td>
</tr>
<tr>
<td><strong>Operational policy</strong></td>
<td>No acid sulfate drain spoil is to be disturbed or excavated without appropriate treatment.</td>
</tr>
<tr>
<td><strong>Performance criteria</strong></td>
<td>All material excavated from drains to be limed at prescribed rate before stockpiling.</td>
</tr>
<tr>
<td><strong>Implementation strategy</strong></td>
<td>Lime treatment of drain spoil removed from drains situated below RL 5.0m AHD is to be undertaken according to the following treatment measures:</td>
</tr>
<tr>
<td><strong>Lime treatment</strong></td>
<td>• All spoil removed from drains situated below RL 5.0m AHD is to be treated with lime at a prescribed rate. The ‘Acid Sulfate Management Plan’ prepared by Bowler Geotechnical (January, 2005) recommends treatment with lime at a rate of 5kg/m$^2$ of materials exhibiting nil sulfidic acidity.</td>
</tr>
<tr>
<td></td>
<td>• To aid mixing, half the prescribed amount of lime should be applied to the drain spoil in situ before mechanical cleaning with a weed bucket.</td>
</tr>
<tr>
<td></td>
<td>• The remaining half of the lime should be applied as a bed onto which the removed drain spoil material is placed.</td>
</tr>
<tr>
<td></td>
<td>• Exposed drain batters must be surface limed within 24 hours following drain cleaning.</td>
</tr>
<tr>
<td></td>
<td>• Limed drain spoil should not be stockpiled within 40m of an existing drain.</td>
</tr>
<tr>
<td></td>
<td>• Lime in the treatment bed is to be thoroughly mixed into the stockpiled drain spoil as soon as the spoil material is dry enough to cultivate.</td>
</tr>
<tr>
<td></td>
<td>• If iron monosulfides (‘black drain sludge’) are removed from the drain, this material should be limed at the prescribed rate and cultivated into the topsoil as soon as the material is dry.</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>Collect lime delivery dockets and compare with calculated amounts required.</td>
</tr>
<tr>
<td><strong>Auditing</strong></td>
<td>Auditing will be undertaken by the site manager and/or the developer’s nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the DMMP.</td>
</tr>
<tr>
<td><strong>Reporting</strong></td>
<td>Records kept on site during maintenance operations and available for inspection at all times.</td>
</tr>
</tbody>
</table>
| Identification of incident or failure | Examination of works for evidence of;  
| • Yellow efflorescence on soil surface,  
| • Iron staining of soils or water,  
| • Sulphurous odour and;  
| • Low pH in water bodies. |
| Corrective action | Testing of drain spoil materials using POCAS method and re-evaluation of prescribed liming rate. |

Commitment 4

The Developer will ensure that no acid sulfate drainage spoil is disturbed or excavated without appropriate treatment.
4.3 Sediment and erosion control

<table>
<thead>
<tr>
<th>Person Responsible</th>
<th>Consulting Engineer, Contractor’s Site Manager</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Issue</th>
<th>Sediment and erosion control.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational policy</td>
<td>To prevent the displacement of sediment and soil from drains particularly during storm events.</td>
</tr>
<tr>
<td></td>
<td>Compliance with the NSW POEO Act (1997).</td>
</tr>
<tr>
<td>Performance criteria</td>
<td>Drain maintenance operations should aim to minimise erosion and the resultant turbidity of discharge waters.</td>
</tr>
<tr>
<td>Implementation strategy</td>
<td>• To contain sediment during drain maintenance, temporary sediment and erosion control measures (including silt fences and floating silt curtains) are to be installed downstream of works prior to cleaning.</td>
</tr>
<tr>
<td></td>
<td>• Stockpiled drain spoil should be stored in a manner to minimise soil being washed offsite.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Carry out visual inspections after rainfall events (&gt;25mm in 24hrs) to ensure that erosion measures are in place and operational to suit the activities taking place at the time.</td>
</tr>
<tr>
<td>Auditing</td>
<td>Visual inspections to be carried out monthly and after rainfall events to verify that control measures are in place and properly maintained.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Reporting only required if insufficient sediment and erosion measures are identified.</td>
</tr>
<tr>
<td>Identification of incident or failure</td>
<td>• Signs of erosion on site.</td>
</tr>
<tr>
<td></td>
<td>• Damaged or failed erosion control devices.</td>
</tr>
<tr>
<td></td>
<td>• Declining/deteriorating water quality as identified by Environmental Consultant.</td>
</tr>
<tr>
<td></td>
<td>• Excessive build-up of sediment.</td>
</tr>
<tr>
<td>Corrective action</td>
<td>Apply remedial measures to improve sediment and erosion measures. This may include:</td>
</tr>
<tr>
<td></td>
<td>• the installation of additional erosion and sediment control measures</td>
</tr>
<tr>
<td></td>
<td>• maintenance of existing controls</td>
</tr>
<tr>
<td></td>
<td>• additional controls or structures as directed by the Environmental Consultant or the developer’s nominated representative.</td>
</tr>
</tbody>
</table>

Commitment 5

The Developer will ensure that appropriate and adequate erosion and sediment control measures are installed and maintained for the duration of drainage maintenance works.
### 4.4 Surface water quality management

<table>
<thead>
<tr>
<th>Person responsible</th>
<th>Contractor’s Site Manager</th>
</tr>
</thead>
</table>

**Issue**

Surface water quality in the receiving environments, including Cudgen Creek.

**Operational policy**

To prevent adverse impacts to surface water quality in the downstream receiving environment.

**Performance criteria**

Any surface water downstream of sediment and erosion control measures (silt curtains) will comply with the following criteria.

<table>
<thead>
<tr>
<th>Water Quality Parameter</th>
<th>Release Criteria</th>
<th>Criteria Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH*</td>
<td>As developed from background monitoring</td>
<td>Range</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>&lt;1.5mS/cm</td>
<td>Maximum</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>&lt;50mg L⁻¹</td>
<td>Maximum</td>
</tr>
<tr>
<td>Turbidity</td>
<td>As developed from background monitoring</td>
<td>Maximum</td>
</tr>
<tr>
<td>Dissolved oxygen</td>
<td>60-105% saturation</td>
<td>Minimum</td>
</tr>
<tr>
<td>Total and dissolved Iron</td>
<td>&lt;0.3mg L⁻¹</td>
<td>Maximum</td>
</tr>
<tr>
<td>Filtered Aluminium</td>
<td>As developed from background monitoring</td>
<td>Maximum</td>
</tr>
<tr>
<td>Litter and gross pollutants</td>
<td>No man made material &gt;5mm in any dimension</td>
<td>--</td>
</tr>
<tr>
<td>Oil and grease</td>
<td>No visible film, no detectable odour</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note that pH will be consistent with receiving water quality. If receiving waters are estuarine, pH should be 6.5 – 8.5; if receiving waters are acidic, pH should be 4.2 – 6.7 in accordance with the Threatened Species Management Plan (JWA 2011) for habitat requirements for Wallum Froglet (Crinia signifera) and Olongburra Frog (Litoria olongburensis).*

**Implementation strategy**

Surface water monitoring will be undertaken downstream of sediment and erosion controls (floating silt curtain).

Sediment and erosion control measures will be implemented in accordance with Section 4.3 and the *Kings Forest Stage 1 Project Application Erosion and Sediment Control Plan Report* (G&S 2011).

Only appropriate herbicides are to be used in accordance with TSC specifications.

All monitoring equipment shall be maintained in a functional condition, calibrated and serviced at a frequency compliant with the manufacturers’ specifications.
Further visual assessment shall be undertaken for evidence of:

- yellow efflorescence on soil surface
- iron staining of soils or water.

### Monitoring

Monitoring for pH, electrical conductivity, suspended solids, turbidity, dissolved oxygen, litter and gross pollutants and oil and grease will be conducted daily during drainage maintenance works.

Monitoring for aluminium and total and dissolved iron will occur weekly. If iron floc, sediments or iron staining are observed downstream of works, samples should also be taken for laboratory analysis and works halted until water has been treated to adequate levels. Iron indicator strips will be used if practicable.

### Auditing

Auditing will be undertaken by the site manager and/or the developer’s nominated representative.

Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the DMMP.

### Reporting of monitoring results

Water quality monitoring results will be recorded and kept onsite for inspection by local and state government officers.

Water quality monitoring reports will be provided to Tweed Shire Council or DECCW upon request.

### Identification of incident or failure

The results of the water quality monitoring indicating concentrations exceeding the limits specified in the ‘performance criteria’ for a single water quality parameter.

Deterioration in surface water quality downstream of the development resulting from site works or the discharge of waters from the development site.

### Corrective action

Take necessary steps to address the problem to prevent a recurrence.

- Addition of hydrated lime to contained waters to increase pH to within the recommended range (consistent with the receiving environment).
- Addition of gypsum to contained waters to reduce suspended solids as required.
- Drainage maintenance works to cease until appropriate monitoring has occurred and results verify that the release criteria have been met.

### Commitment 6

Management will ensure, through inspection and insitu analysis that no adverse impact on surface water quality results from drainage maintenance on site.
## 4.5 Herbicide application

<table>
<thead>
<tr>
<th>Person responsible</th>
<th>Contractor’s Site Manager</th>
</tr>
</thead>
</table>

### Issue
Application of herbicide to control weed growth adjacent to the east-west drain.

### Operational policy
The application of herbicide must be performed in compliance with ‘best practice’ measures.

### Performance criteria
Herbicide should be applied following the manufacturer’s instructions and recommendations.

### Implementation strategy
- Herbicides used adjacent to drains must be approved for use in sensitive aquatic areas to reduce potential fauna mortality.
- Herbicides must be diluted and applied in accordance with the manufacturer’s guidelines.
- Application of herbicide through spot spraying should be used in preference to blanket spraying.
- Only listed weed species should be targeted to protect rootstock on the batters.

### Monitoring
A visual inspection of flora and fauna within the drain should be undertaken within 48 hours of herbicide application to ensure no adverse impacts have resulted from the application.

### Auditing
Auditing will be undertaken by the site manager and/or the developer’s nominated representative.

Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the DMMP.

### Reporting
Records of herbicide applications are to be kept on site for inspection at all times.

### Identification of incident or failure
- The presence of deceased fauna within the drains.
- The presence of dead non-target flora species adjacent to drains.

### Corrective action
- Cease herbicide applications immediately and review the rate, type and method of herbicide being applied.
- Review of application methods, contractor training and awareness of the DMMP.

### Commitment 7
Management will ensure, through inspection, that no adverse impact on flora or fauna have resulted from the application of herbicide.
5 Administration of the DMMP

5.1 Amendment of the DMMP

The Developer may make an application to Tweed Shire Council to amend the provisions of this DMMP. The application shall:

- be in writing; and
- specify the provisions of the DMMP to which the application relates; and
- state how the proposed amendments achieve the objectives of the provisions to which the amendments relate.

Tweed Shire Council shall approve the amendment where Council is satisfied, acting reasonably, that the proposed amendments achieve the objective of the provisions to which the amendment relates.

5.2 Incident management

The Developer and any person appointed by the Developer as having responsibility for a control strategy set out in this DMMP have clearly defined responsibilities under the NSW Protection of the Environment Operations Act (1997) to report any incidents likely to cause material or serious environmental harm.